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AUTHOR	Sklar, Sigmund L.
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ABSTRACT

An overview of per-pupil expenditures for education is provided, such expenditures being the most widely used measure of quality education. As a measure of disparity in educational quality, it points up the problem of lack of comparability. Based on investigation and study of the disparities in per-pupil expenditure, the report identifies three major problem areas believed to contribute substantially to the lack of comparability in these statistics: (1) the present methods of calculation, (2) the usefulness of the present formulation in measuring disparities, and (3) the difficulty inherent in making interdistrict comparisons of expenditures. Recommendations submitted include steps for revising present methods of expenditure calculation and interdistrict comparisons. Four case studies are included. (For related document, see ED 058 473.) (Author/IRT)

ED 058 505

In Search of a Rational Basis For Measuring Disparities

A Review of Per-Pupil Expenditure Makeup

AA 000 809

Submitted to The President's Commission on School Finance

THIS IS ONE OF SEVERAL REPORTS PREPARED FOR THIS COMMISSION. TO AID IN OUR DELIBERATIONS, WE HAVE SOUGHT THE BEST QUALIFIED PEOPLE AND INSTITUTIONS TO CONDUCT THE MANY STUDY PROJECTS RELATING TO OUR BROAD MANDATE. COMMISSION STAFF MEMBERS HAVE ALSO PREPARED CERTAIN REPORTS.

WE ARE PUBLISHING THEM ALL SO THAT OTHERS MAY HAVE ACCESS TO THE SAME COMPREHENSIVE ANALYSIS OF THESE SUBJECTS THAT THE COMMISSION SOUGHT TO OBTAIN. IN OUR OWN FINAL REPORT WE WILL NOT BE ABLE TO ADDRESS IN DETAIL EVERY ASPECT OF EACH AREA STUDIED. BUT THOSE WHO SEEK ADDITIONAL INSIGHTS INTO THE COMPLEX PROBLEMS OF EDUCATION IN GENERAL AND SCHOOL FINANCE IN PARTICULAR WILL FIND MUCH CONTAINED IN THESE PROJECT REPORTS.

WE HAVE FOUND MUCH OF VALUE IN THEM FOR OUR OWN DELIBERATIONS. THE FACT THAT WE ARE NOW PUBLISHING THEM, HOWEVER, SHOULD IN NO SENSE BE VIEWED AS ENDORSEMENT OF ANY OR ALL OF THEIR FINDINGS AND CONCLUSIONS. THE COMMISSION HAS REVIEWED THIS REPORT AND THE OTHERS BUT HAS DRAWN ITS OWN CONCLUSIONS AND WILL OFFER ITS OWN RECOMMENDATIONS. THE FINAL REPORT OF THE COMMISSION MAY WELL BE AT VARIANCE WITH OR IN OPPOSITION TO VIEWS AND RECOMMENDATIONS CONTAINED IN THIS AND OTHER PROJECT REPORTS.

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IN SEARCH OF A RATIONAL BASIS FOR MEASURING DISPARITIES

(A Review of Per-Pupil
Expenditure Makeup)

Submitted to the President's
Commission on School Finance

By Sigmund L. Sklar
Research Director
October 31, 1971

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I. AN OVERVIEW

A. PER-PUPIL EXPENDITURES - TODAY'S CRUCIAL MEASURE OF DISPARITY

Per-pupil expenditures are today, the most widely used measure of quality education. This is not to say that they are the best - or even a good measure, - only that those concerned with an examination of the educational process invariably resort to per-pupil expenditures as an available basis to compare one educational system to another.

The problems of trying to measure the qualitative outputs of the educational process primarily in terms of dollars expended on each pupil has been addressed time and again in educational research literature. The research to date indicates that educational outputs (primarily measured in terms of cognitive achievement test scores) are only partially related to the amount expended on each pupil. But until better measures of disparity in educational quality are perfected and used, it appears that this measure will still be extensively relied upon.

But even if per-pupil expenditures were to be used merely to show disparities in educational inputs between educational agencies it is still besieged with the problem of lack of comparability.

The makeup of per-pupil expenditure statistics varies significantly from agency to agency. These variations stem from a variety of causes which do not always relate directly to the differences in true level of resources being committed to the educational process.

Findings in regard to the nature and magnitude of these variations are such that the present practices in computing these statistics preclude their usefulness in meeting even the most basic of objectives, that of measuring the relative levels of resource being made available to the delivery of educational programs by the many educational systems throughout the country.

School officials at all levels should know the level of resources being committed to educate students in their school systems as well as in comparable school systems. If equality of educational opportunity is in any way related to educational finance, and we believe it is, relative costs of delivering comparable programs to students should be known.

Accordingly we have tried to address ourselves not only to the identification of the causes of variation; but have also undertaken the task of making suggestions as to how to improve the comparability of per-pupil expenditure statistics as well.

B. CURRENT FORMULATION

The U. S. Office of Education has set out guidelines for determining per-pupil expenditures for education. These guidelines cover four factors which need to be considered:

(1) The pupil unit of measure to be used;

(2) The expenditure accounts to be considered;

(3) The period of time for which a per-pupil expenditure figure is to be computed, and

(4) The program areas to be included in a per-pupil expenditure figure.

U.S. O.E.'s guidelines for each of these four factors are as follows:

(1) That average daily membership be used as the pupil unit of measure,

(2) That only expenditures relating to the functions of administration, instruction, attendance and health services, pupil transportation services, operation and maintenance of plant, and fixed charges be included in the computation;

(3) That per-pupil expenditures be computed on an annual basis; and

(4) That program areas which are included in per-pupil expenditure figures be indicated and expenditures for program areas not generally included be eliminated.

U.S. O.E. recommended the use of ADM "because it averages out the load that the schools are carrying and provides a more realistic picture than other available measures of the number of pupils for whom the expenditures were made." 1/

1/ Financial Accounting for Local and State School Systems," U.S. Dept. of HEW, USOE, OE-22017, p.127

The expenditure accounts mentioned above were recommended for inclusion "because of their direct relationship and essentiality to the educational program." 2/

No specific arguments were presented for adopting an annual time period or for including elementary, secondary and adult programs in the calculation of per-pupil expenditures.

2/ IBID p.128

C. PROBLEMS INHERENT IN PRESENT METHODS OF CALCULATION

1. DIFFICULTY IN DETERMINING THOSE ELEMENTS OF EXPENDITURE WHICH ARE EITHER DIRECTLY RELATED AND/OR ESSENTIAL TO THE DELIVERY OF THE EDUCATIONAL PROGRAM

In order for the per-pupil expenditure statistic to be useful as a measure of disparity in equal educational opportunity it should at least be able to reflect how much was spent on each pupil in the way of educational services.

While "educational services" could be used to encompass every dollar spent, whether it be interest on loans or a classroom teacher's salary, the intent in this paper is to conceive of educational services as the necessary component of instruction and direct support thereof.

In looking at the U.S.O.E. guidelines for expenditure accounts to be included in the calculation of per-pupil expenditures, we found upon further study that some of these functional categories were composed of types of expenditure which were either not related to the delivery of educational services or which were not of a normally recurring nature and thereby could distort inter-districts comparisons in any given year.

We also found that certain expenditures contained in the functional categories recommended for elimination were related to the routine delivery of educational services.

2. INCONSISTENCIES IN THE METHOD OF CALCULATING PER-PUPIL EXPENDITURES

a. DIFFERENT PUPIL UNITS OF MEASUREMENTS ARE IN USE

Although the U.S. Office of Education has set out guidelines for determining per-pupil expenditures in their handbook in 1957, we found sufficient evidence to indicate a divergence of practice among school districts and/or states.

For instance, uniform usage of average daily membership (ADM) as the pupil unit of measurement has not been attained throughout the country. U.S.O.E. recommends that where it is not in use that "during the period of transition" [3] average daily attendance (ADA) be used.

This ambiguity is implicitly a cause of problems. Average daily attendance for a given school district in a given school year is nearly always less than average daily membership but the relationship between ADA and ADM is not uniform in all districts.

Although ADM is a preferred measure in that it includes all pupils enrolled, it is more difficult to obtain with the same accuracy in certain districts.

Accordingly, it is quite possible to introduce considerable distortion into the per-pupil expenditure statistic if either different bases are used or inaccurate pupil counts are reported.

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[3] IBID p.127

b. COSTS ARE NOT ALWAYS RECORDED IN THE SAME WAY

A review of the standardized account definitions and guidelines for recording school district revenues and expenditures indicated possibilities of divergence in treatment of certain costs of delivery of educational services. These same possibilities have been corroborated in discussion with educational statisticians and school district administrators. For instance, certain costs are offset by revenue receipts and only expenditure overages get included in per-pupil expenditures. Certain costs are treated as parts of revolving funds and may or may not be included as part of per-pupil expenditures. Certain program's (such as Title I) either get recorded across all functional categories of expense or as separate functional categories. In other instances, these expenditures are not included at all. On the other hand costs of certain services which are provided to school districts by other agencies out of their own budgets are not normally reflected.

A good bit of variation in treatment appears to take place in those districts that are not subject to strict regulation by the state educational agencies and who are motivated by funding pressures to disclose expenditures in a more favorable way.

D. PROBLEMS IN THE USEFULNESS OF PRESENT FORMULATION IN MEASURING DISPARITIES IN EDUCATIONAL SERVICES

1. EXPENDITURES NOW INCLUDED IN PER-PUPIL EXPENDITURE MAKEUP WHICH DO NOT TRULY MEASURE THE COST OF DELIVERY OF EDUCATIONAL SERVICES

U.S.O.E. in their recommendations as to what types of expenditure to include in per-pupil expenditures suggests that such expenditures be either directly related or essential to educational programs.

Because we are seeking to improve the per-pupil expenditure statistic as a measure of disparity in educational services we believe that greater comparability would be obtained if only the instructional component and direct instructional support component of expenditures are used.

Viewed in this way we would not include attendance and health services or pupil transportation services in the calculation. Using the same criteria we would eliminate administrative expenditures for such items as Boards of Education, Treasurers Office, school elections, public relations and centralized research. We would also eliminate non-instructionally related portions of fixed charges. The results of such recommended eliminations would be material. An appended case study suggests that approximately 12 % of the per-pupil expenditures would be eliminated (refer to Section III A).

2. EXPENDITURES NOT NOW INCLUDED IN PER-PUPIL EXPENDITURE MAKEUP WHICH DO MEASURE THE COST OF DELIVERY OF EDUCATIONAL SERVICES

In addition to recommending for exclusion such expenditures as food services, student-body activities, community services and outgoing transfers, U.S.O.E. suggests exclusion of capital outlay and debt service. To be consistent with the criteria we adopted, we believe that costs of providing school facilities ought to be included in per-pupil expenditures. The procedures for doing this are discussed in a later section dealing with occupancy costs.

E. PROBLEMS INHERENT IN MAKING INTER-DISTRICT COMPARISONS OF PER-PUPIL EXPENDITURES

The costs of delivering comparable educational services vary by school district characteristics. School districts can be categorized as to where they are located; how big they are; their financial status and the type and mix of programs they offer. The recognition of the different characteristics of school districts and how they impact on costs is pivotal in making comparisons which imply differences in educational services delivered.

F. BASIC RECOMMENDATIONS

Based on our findings we would recommend:

(1) That guidelines be refined for recording of costs in a more consistent manner and for standardizing on the pupil unit of measure

(2) That the per-pupil expenditure formula be revised to include only those items of expenditure that best measure the cost of delivering educational services

(3) That a standardized approach to classification of 'like' school districts be developed for use in inter-district comparisons of per-pupil expenditure

(4) That a standardized approach to measuring disparite educational inputs in 'like' school districts be developed.

II FINDINGS AND RECOMMENDATIONS

A. INTRODUCTORY REMARKS

In documenting disparities in terms of per-pupil expenditures it was found that significant variations existed between geographical regions of the U.S., between state-wide averages, and between groups of school districts classified as to types of residence (i.e., urban, suburban, rural).

Significant variation was also found to exist in levels of per-pupil expenditure when groups of similarly classified school districts were compared. When districts per-pupil expenditures were further analyzed by functional component, significant variations were still evident.

In order to identify potential sources of disparity, we investigated the way per-pupil expenditures were being calculated by various agencies. We examined the standardized account definitions in use today and revisions being contemplated. We reviewed the accounting treatments employed in recording and classifying expenditures. We analyzed the impact of the accounting treatments in light of the purpose for which the per-pupil expenditure statistic is being used. We examined various studies which attempted to classify school districts by various attributes and examined distinctions between pupil related and nonpupil related costs. We explored definitions of cost relative to expenditure and examined expenditure levels as related to financial ability. We made extensive additional studies as to how to treat types of expenditure not now included in per-pupil expenditure makeup.

As a result of this investigation and study we have identified three major problem areas which we believe have contributed substantially to the lack of comparability in per-pupil expenditure statistics. Concisely stated they are:

(1) Problems inherent in present methods of calculation;

(2) Problems related to the usefulness of the present formulation of per-pupil expenditure in measuring disparities in educational services; and

(3) Problems inherent in making inter-district comparisons of per-pupil expenditures.

The following paragraphs treat each of these problem areas in greater detail and recommendations are drawn from the findings presented.

B. PROBLEMS INHERENT IN PRESENT METHODS OF CALCULATION

1. CURRENT FORMULATION

The U.S. Office of Education has set out guidelines for determining per-pupil expenditures for education. These guidelines cover four factors which need to be considered:

(1) The pupil unit of measure to be used;

(2) The expenditure accounts to be considered;

(3) The period of time for which a per-pupil expenditure figure is to be computed; and

(4) The program areas to be included in a per-pupil expenditure figure.

In this section we discussed problems associated with factors (1), (3) and (4). We have also presented U.S.O.E. recommended expenditure account inclusions but the problems of includability are treated in the next section.

a. PROBLEMS ASSOCIATED WITH THE PUPIL UNIT OF MEASURE TO BE USED

FINDINGS

There are several ways in which pupil populations served by school districts are estimated. The most common are:

ADA - Pupils in average daily attendance;

ADM - Pupils in average daily membership; and

Enrollment (Membership) - Pupils enrolled as of a given day.

ADA is the most widely used base in per-pupil expenditure development. It is most easily obtained from the attendance records of classroom teachers. However, it does not measure total school district student membership, in that absentees are not counted. Accordingly, if ADA is used as a base it will tend to overstate per-pupil expenditures. In this regard, ADM is intrinsically a better measure of the pupil population served.

But there have been problems in developing accurate average daily membership data. Many school districts, especially in the inner city, have experienced difficulty in gathering accurate ADM data. They sometimes have had to resort to estimating ADM as a function of average daily attendance or enrollment. In many school districts, dropouts, transfers and reenrollments are not easily reconciled between schools in the district. This problem tends to distort the statistics obtained because of double counting.

Additional distortion in ADM is caused by differences in state policy as to when to drop an absent student from the roles. For instance, one state law sets 5 days as the absence period and another leaves it completely up to local school authorities.

In some school districts per-pupil expenditure is computed using enrollment, that is, the number of pupils enrolled on a given date. In terms of accurate counts, enrollment is the most accurate, but only at a given point in time in the school year.

U.S.O.E. recommended the use of ADM because "it averages out the load that the schools are carrying and provides a more realistic picture than other available measures of the number of pupils for whom the expenditures were made." 1/

However U.S.O.E. also suggests that "pending the uniform usage of average daily membership as the pupil unit of measure throughout the country, school systems that adopt average daily membership should, during the period of transition, also have available per-pupil expenditure figures computed on the basis of average daily attendance." 2/ We believe that this suggestion leads to non-uniform practices.

RECOMMENDATION

Because ADA is easier to obtain in a less distorted manner than ADM and because ADA measures pupils served over an entire school year, we believe that at this point in time it *is* the better base to use in development of per-pupil expenditure statistics for use in inter-district comparisons.

b. PROBLEMS ASSOCIATED WITH RECORDING COSTS THE SAME WAY

RECOMMENDED INCLUSIONS

The expenditure accounts recommended by U.S.O.E. for inclusion in determining current expenditures per pupil are:

1/ IBID p.127
2/ IBID p.127

"ADMINISTRATION, 100 Series;
INSTRUCTION, 200 Series;
ATTENDANCE AND HEALTH SERVICES, 300-400 Series;
PUPIL TRANSPORTATION SERVICES, 500 Series;
OPERATION OF PLANT, 600 Series;
MAINTENANCE OF PLANT, 700 Series; and
FIXED CHARGES, 800 Series." 3/

"The 100-800 Series of accounts are included in determining current expenditures per-pupil because of their direct relationship and essentiality to the educational program." 3/

The Expenditure accounts recommended by U.S.O.E. for exclusion in determining current expenditures per-pupil are:

"FOOD SERVICES AND STUDENT-BODY ACTIVITIES, 900-1000;
COMMUNITY SERVICES, 1100 Series;
CAPITAL OUTLAY, 1200 Series;
DEBT SERVICE, 1300 Series; and
OUTGOING TRANSFER ACCOUNTS, 1400 Series." 3/

The rationale given by U.S.O.E. is as follows:

"FOOD SERVICES AND STUDENT-BODY ACTIVITIES, accounted for in varying degree through revolving funds or clearing accounts, are excluded because methods of financing these activities are so diverse that their inclusion would reduce the possibility of securing comparable current-expenditure-per pupil figures." 3/

"COMMUNITY SERVICES are excluded because they are not expenditures for the education of pupils in public schools, but are additional responsi-

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3/ IBID p.128

bilities delegated to the schools over and above their primary function of providing education." 3/

"CAPITAL OUTLAY and DEBT SERVICE are excluded because they are not current expenditures. Per-pupil expenditures are sometimes computed for CAPITAL OUTLAY and DEBT SERVICE separately." 3/

"OUTGOING TRANSFER ACCOUNTS are excluded because, usually, average daily membership figures are not available to the paying district for the pupils for whom expenditures were made." 3/

The exceptions to outgoing transfer eliminations suggested by U.S.O.E. are as follows:

"Fees received by a school district (recorded under the 80-90 Series, INCOMING TRANSFER ACCOUNTS) for services rendered to pupils who do not attend its schools should be deducted from expenditures before computing per-pupil expenditures. For example, suppose school district A contracts to transport pupils residing in school district B to schools in school district B; then school district A should deduct from its pupil transportation expenditures any fees received for such services before computing per-pupil expenditures." 3/

"Amounts paid to other school districts (recorded under the 1400 Series, OUTGOING TRANSFER ACCOUNTS) for services rendered to pupils attending school in the paying district should be added to the included expenditures by the paying district before computing per-pupil expenditures."3/

3/ IBID p.128

METHODOLOGY

We initially accepted U.S.O.E.'s rationale for including only the 100-800 series of accounts in determining per-pupil expenditures. We then undertook a detailed examination of each of these account definitions and guidelines. We also examined revenue recording options. We interviewed educational researchers and statisticians and certain persons with school business administration experience.

FINDINGS

Our review indicated the possibility of divergence in treatment of certain expenditures presently recommended for inclusion in per-pupil expenditures.

First of all, school districts have a variety of ways in which they receive aid.

They receive revenue from local sources (E.G. Taxation and appropriations, tuitions from patrons, transportation fees from patrons, etc.)

They receive revenue from intermediate sources, state sources and federal sources.

They obtain non-revenue receipts from bond sales,loans, school property sales and insurance adjustments.

Secondly, the degree of accountability that is imposed upon school districts by fund providers varies,and based upon the degree to which school district administrators are motivated by funding pressures, disclosure of funds source and use may also vary.

For instance, certain costs may be offset by revenue receipts and only expenditure overages may be shown. Adult education programs covered by tuitions and transportation services covered by fees are good examples.

Certain revolving funds may be set up for food services, health services, operation and maintenance of plant or administration, and could be netted against revenues from intermediate, state or federal sources. Expenditure for certain services are sometimes reflected in the incoming and outgoing transfer accounts.

Certain out-of-pocket costs such as rents may be netted against non-revenue receipts.

Some current expenditures relating to equipments or repairs may be capitalized.

Finally, certain programs, such as Title I, have been treated in a diversity of ways. These program expenditures sometimes get recorded as part of the basic program under the appropriate account categories. They may sometimes be shown in separate accounts under the appropriate series. There are other instances when these program expenditures are eliminated.

U.S.O.E. recommends "that the program areas, such as elementary schools, secondary schools, adult education, etc., which are included in per-pupil expenditure figures be indicated, and that expenditures for other program areas be excluded, insofar as possible." 4/ Although guidelines are provided by U.S.O.E. for doing the necessary prorations, for the most part they are very broad in nature.

RECOMMENDATIONS

U.S.O.E. must provide more definitive guidelines for recording costs consistently.

(1) All instructionally related services should be reflected at their true cost.

(2) Guidelines should be specific as to how to cost out services that are 'donated.'

(3) Guidelines should address when it is or is not appropriate to make offsets between revenue and non-revenue receipts.

(4) Guidelines should be sharpened as to how and when to capitalize costs, how to treat pension funds, revolving funds and rebates.

(5) Guidelines as to which programs to include or exclude in per-pupil expenditures should be developed and the methodology for prorating such expenditures should be made more specific.

4/ IBID p.129

c. PROBLEMS ASSOCIATED WITH THE PERIOD OF TIME TO USE IN CALCULATING PER-PUPIL EXPENDITURES

FINDINGS

U.S.O.E. recommends "that per-pupil expenditures be computed on an annual basis, however, they may be computed for shorter periods. For example for tuition purposes, it may be necessary to compute per-pupil expenditures on a daily basis for the regular day schools or on an hourly basis for adult education and summer school program areas. The period of time for which a per-pupil expenditure figure is computed should always be indicated." 5/

RECOMMENDATIONS.

We believe that the annual basis ought to be adopted specifically for the purposes of developing per-pupil expenditure statistics to be used in inter-district comparisons.

5/ IBID p.129

C. PROBLEMS RELATED TO THE USEFULNESS OF THE PRESENT FORMULATION OF PER-PUPIL EXPENDITURE IN MEASURING DISPARITIES IN EDUCATIONAL SERVICES

1. EXPENDITURES NOW INCLUDED IN PER-PUPIL EXPENDITURE MAKEUP WHICH DO NOT TRULY MEASURE THE COST OF DELIVERY OF EDUCATIONAL SERVICES

U.S.O.E. in their recommendations as to what types of expenditure to include in per-pupil expenditures suggests that such expenditures be either directly related or essential to educational programs.

Because we are seeking to improve the per-pupil expenditure statistic as a measure of disparity in educational services we believe that greater comparability would be obtained if only the instructional component and direct instructional support component of expenditures are used.

METHODOLOGY

In order to determine which items of expenditure now included in the U.S.O.E. recommended formulation should be eliminated based on our criteria, we examined each series of accounts.

Where appropriate we reviewed the description of each set of accounts contained in the series.

U.S.O.E. FORMULATION

As previously documented, U.S.O.E. recommends the inclusion of the following series of expenditure accounts in per-pupil expenditure makeup.

100 - Administration;
200 - Instructional;
300 - Attendance Services;
400 - Health Services;
500 - Pupil Transportation Services;
600 - Operation of Plant;
700 - Maintenance of Plant;
and
800 - Fixed Charges.

a. CRITERIA ADOPTED - AN EXPLANATION

Because it was our intent to refine the per-pupil expenditure statistic so that it would reflect how much was being spent on each pupil for 'educational services'; we felt a definition was required. We have defined 'educational services' as being that type of service which most directly provides an 'educational experience.'

Furthermore, we assumed that an 'educational experience' is that type of experience which most often takes place between teachers and pupils in classroom confrontations. In addition, we viewed those expenditures which were 'related' to the delivery of 'educational services' as those expenditures that were directly identifiable to acts of providing 'educational experiences.'

For instance, it is hard to envision a teacher instructing a classroom full of children without having access to books and other instructional materials that are necessary. On the other hand it is quite possible to envision the delivery of educational services going on without such support activities as educational research, curriculum design, extra curricular student body activities and the like. However, teachers teach in schools which can be thought of as groups of classrooms. In order for schools to operate on a day-to-day basis certain support activities are essential. Teaching staffs have to be coordinated. Educational programs that have been agreed upon have to be supervised, and records maintained. In addition physical facilities have to be operated.

Although there are large numbers of activities that take place at the school and district level which ultimately impact upon delivery educational experiences, they can be viewed as being more or less indirect. Being indirect it is hard to measure the degree to which they enrich educational experiences of pupils. Therefore our particular focus was on measuring classroom related educational services. We made the assumption that by limiting our definition of educational services to instructional expenditures and direct instructional support expenditures, we would be able to make better inter-district comparisons.

FINDINGS AND RECOMMENDATIONS

By adopting this 'direct services' philosophy it was easy for us to rationalize the elimination of the following series of expenditure accounts from U.S.O.E.'s recommended list:

300 - Attendance Services,
400 - Health Services; and
500 - Pupil Transportation Services.

We rationalized that pupil transportation services, although extremely important, were not directly related to delivery of educational services and should be eliminated from the computation of per-pupil expenditures. Similar rationale was used in suggesting the elimination of attendance services and health services. All three of these functional categories relate to activities directed at obtaining and maintaining as high a level of attendance as possible. Although it can be argued that it is impossible to deliver educational services without having the pupils in attendance to receive such services, we believe transportation, attendance and health maintenance are merely supportive to the process of educational delivery. However, we do suggest leaving the following account series in the calculation of per-pupil expenditures:

200 - Instruction,
600 - Operation of Plant, and
700 - Maintenance of Plant.

As far as operation of plant and maintenance of plant are concerned we maintain that only those expenditures which reflect routine costs of operating school facilities ought to be included. For instance, fuel and power costs, and costs of custodial services should be included. Any other costs necessary in the day-to-day operation of school facilities should also be included. Unfortunately, the account structure presently in use does not facilitate this disaggregation we believe to be necessary. Other account series proved more difficult.

For instance, series 100 - Administration, includes the following account categories:

a. Board of Education
b. Board Secretary's Office
c. Treasurer's Office
d. School Elections
e. Tax Collection
f. Legal Services
g. Superintendent's Office
h. Personnel Office
i. Public Relations
j. Centralized Research
k. Census Enumeration
l. Office of Business Administration
m. Fiscal Control

n. Administration of Buildings and Grounds

o. Purchasing Office

p. Printing and Publishing

q. Other Salaries for Administration

Because most of these accounts describe indirect support activities we recommend that only the underlined accounts be included in per-pupil expenditures.

Series 800 - Fixed Charges, includes the following account categories:

810. SCHOOL DISTRICT CONTRIBUTIONS TO EMPLOYEE RETIREMENT

810-a. State, County, or Local Retirement Funds

810-b. Social Security

810-c. Pension Payments

820. INSURANCE AND JUDGMENTS

820-a. Property Insurance

820-b. Employee Insurance

820-c. Liability Insurance

820-d. Fidelity Bond Premiums

820-e. Judgments

830. RENTAL OF LAND AND BUILDINGS

830-a. Land and Buildings for Instructional Purposes

830-b. Land and Buildings for Noninstructional Purposes

840. INTEREST ON CURRENT LOANS

850. OTHER FIXED CHARGES

We recommend a proration be made of all school district contributions to employee retirement (810) and employee insurance payments (820b). The amount prorated to previously identified 'instructionally related' salaries should be included into the formulation. Other insurances (820a) and rentals of land and buildings for instructional purposes (830a) should also be included.

2. EXPENDITURES NOT NOW INCLUDED IN PER-PUPIL EXPENDITURE MAKEUP WHICH DO MEASURE THE COST OF DELIVERY OF EDUCATIONAL SERVICES

In addition to recommending for exclusion such expenditures as food services, student-body activities, community services and outgoing transfers, U.S.O.E. suggests exclusion of capital outlay and debt service. To be consistent and with the criteria we adopted, we believe that costs of providing school facilities ought to be included in per-pupil expenditures.

a. FINDINGS

The costs of providing school facilities, (e.g., the cost of occupancy) are not now easily estimated from the existing expenditure accounts.

First of all the capital outlay and debt service accounts reflect not only the cost of purchasing and financing school buildings and instructional equipment, they also reflect costs associated with purchase and finance of transportation equipment, other equipment, buildings, and renovations which are for non-school use.

Secondly, these accounts reflect only current outlays of funds and do not show use and occupancy costs of equipments and buildings purchased in prior periods but still in use. Accordingly, we believe that an occupancy cost reflecting the equivalent rental of equipped classrooms available for use should be developed and added into the per-pupil expenditure calculation. This would permit a more accurate reflection of capital outlay and debt service expenditures.

Under the fund accounting approach now employed in school district accounting, several treatments of occupancy cost are possible.

For instance, if a school district rents equipment or buildings, rental payments are recorded as part of current expenditures under the functional category most appropriate. If a school district borrows a portion of the funds required for a capital expenditure such as a school building, the amount borrowed is not reflected in current expenditures The amount of principal and interest repaid in the period is recorded under debt service. But the total amount of funds expended in the school year on capital projects (regardless of fund source) is recorded in the capital outlay account. Neither of these accounts are reflected in the per-pupil expenditure statistic. Even if they were, they would hardly reflect an accurate cost of providing school facilities for that school year or for subsequent school years.

The costs of occupying school facilities in a given school year more realistically would have to be developed by spreading the total costs of such facilities over the number of school years in which they are available.

The current method of not reflecting occupancy costs in the per-pupil expenditure statistic does not facilitate comparisons between those school districts which provide up-to-date and pleasant learning environments to those school districts which provide run down and depressing learning environments.

In order to demonstrate the importance of occupancy cost disparities we conducted a study using depreciation as a proxy of occupancy cost. The study demonstrated that there were significant differences in depreciation per-pupil among 15 big cities tested and between these cities and national averages.

b. RECOMMENDATIONS

Costs of providing classroom facilities must be included in per-pupil expenditure calculations.

This 'occupancy cost' ought to be developed from expenditures normally recorded in the capital outlay and debt service accounts.

The two elements that would have to be developed are:

(1) The annual depreciation for school buildings based on their 'cost basis' and 'useful life'

(2) The annual interest amortization on debt used to finance such buildings

A similar treatment should be given to instructional equipment which was capitalized.

Finally, rentals of buildings and instructional equipments should be reclassified into the occupancy cost category.

D. SUMMARY OF RECOMMENDATIONS

1. The revised per-pupil expenditure calculation should include the following types of expenditures and costs:
    - Instruction,
    - Instructionally related administration;
    - Instructionally related fringe benefits;
    - School building rentals and insurances;
    - Occupancy costs of school buildings available for use;
    - Costs of operating school facilities available for use, and
    - Cost for use of available instructional equipments.
2. These expenditures and costs should be annualized.
3. The pupil unit of measure to be used should be average daily attendance.
4. Costs of all programs being delivered should be reflected across the proper expenditure categories. These costs should be easily identifiable for segregation and analysis.

E. PROBLEMS INHERENT IN MAKING INTER-DISTRICT COMPARISONS OF PER-PUPIL EXPENDITURES

The cost of delivering comparable educational services vary by school district characteristics. School districts can be categorized as to where they are located, how big they are, their financial status and the type and mix of programs they offer. The recognition of the different characteristics of school districts and how they impact on costs is pivotal in making comparisons which imply differences in educational services delivered.

1. FINDINGS

Examination of recent inter-district per-pupil expenditures comparisons indicate that differences obtained can be attributed not only to the amount of educational services delivered but also to the nature of the school districts being compared.

Also in evidence was the fact that certain 'types' of districts typically provide different levels of services, educational and otherwise.

Some studies using advanced statistical techniques have attempted to identify the magnitude of per-pupil expenditure differentials by various cost factors. These studies have been but a partial success. However, there are certain components of cost which have been documented as being influenced by school districts' characteristics. The characteristics discussed here are:

a. Location;

b. Size;

c. Wealth, and

d. Program offerings.

a. LOCATION

School districts are most easily classified as to type of residence, (e.g., urban, suburban or rural) and by region (e.g., Northeast, North Central, South, West).

The primary influence of regional classification of districts is on overall cost of living differentials.

Characteristically the south has experienced a relatively low cost of living in comparisons to the north or west.

But the type of residence classification criterion has had an even greater impact in explaining cost differentials. Recent studies have shown that urban districts, particularly in the north, have employed higher salary schedules than their neighboring suburban districts.

On the average, they have had to pay higher salaries which were in part due to the higher age and experience levels of the teaching professionals they employ. It was found that operating costs were also higher.

On the other hand rural districts characteristically transport a higher percentage of their pupils over greater distances.

Depending on degree of sparsity they often are forced to operate with smaller class sizes.

Many suburban districts examined have experienced more growth in enrollments and accordingly, more school construction and younger professional staffs. But due to their relative financial abilities they have generally been able to provide high starting salaries and enriched curriculums.

b. SIZE

School district size can be measured in several ways. Most common are enrollment size and size of professional staff. Although these measures are similar, enrollment size tends to explain in the long run, changes in number of facilities being used and in the short run, class size. Size of professional staffs, although enrollment related, tend to provide more direct measures of the size of administrative and instructional support staffs. It is well known that large districts often build up more administrative layers than do small ones.

c. WEALTH

School district wealth is more often measured in terms of assessed valuation per capita, revenue per-pupil or program funds available. Obviously the size of fixed obligations impacts on program funds available, and program funds available often dictate the level of program enrichment possible.

d. PROGRAM OFFERINGS

The literature has documented the basic cost differentials associated with delivery of different programs. Most of these cost differentials are attributed to the staffing ratios and staffing mixes required to deliver such programs as:

A pre-school program;
A basic elementary school program;
A secondary school program;
A vocational program;
A compensatory program,

or any of a miriad of other special programs.

Accordingly, it is essential that the size and mix of various programs be known when comparing school districts per-pupil expenditures.

2. RECOMMENDATIONS

a. School districts should at least be stratified by enrollment size; type of residence, and region or state prior to making inter-district comparisons.

b. Once so classified, a standardized method for measuring 'disparities' among 'like' school districts should be adopted.

Such a method should be capable of identifying variances in -

(1) Classroom teacher expenditures,

(2) Instructional support staff expenditures, and

(3) Other educational service costs.

d. Classroom teacher expenditure variances must be capable of being differentiated into two components; pupil-teacher ratios, and teacher salary schedules.

1. Instructional support staff variances must be capable of being differentiated into three components:

instructional support staff-teacher ratios, pupil-teacher ratios, and instructional support staff salary schedules.

2. Other educational service costs variances must be capable of being differentiated into two components:

Levels of service provided (volume variances) and cost per unit of service provided (spending variances).

CASE STUDIES

A. A RECLASSIFICATION OF EDUCATIONAL EXPENDITURES IN A LARGE SCHOOL DISTRICT (MONTGOMERY COUNTY MARYLAND) TO ARRIVE AT PER-PUPIL COST OF DELIVERING EDUCATIONAL OPPORTUNITIES

1. CONCEPTUAL APPROACH

A recomputation of Montgomery County per-pupil expenditures was made incorporating the following concepts:

- "Operating costs were separated from one-time costs and capital costs";
- "Per-pupil expenditures were developed using instructionally related" current expenditures and 'total pupil related' current expenditures as a base".

Two questions asked in classifying expenditure categories were:

- Does this expenditure relate to delivery of educational services as defined previously in this paper?
- If it does, does this expenditure normally recurr during the course of delivering such services?

2. METHODOLOGY

Every attempt was made to recompute per-pupil expenditures according to recommendation developed in Section II D of this report.

Because the Montogomery County School System did not employ the same chart of accounts as set forth in U.S.O.E. Handbook II (OE-22017), application of these recommendations were made judgmentally. In addition, the detailed list of expenditure accounts enumerated in Section III B1 and III B2 were used as a guide.

3. MONTGOMERY COUNTY SCHOOL SYSTEM's PRESENT COMPUTATIONAL METHOD

Key Code		
(1)	Total Current Fund Expenditures (Exh. II - P.2) (EXHIBIT II - Page 3)	116,608,578.95
	Plus	
(2)	Total Supported Programs Fund (EXHIBIT II - Page 3)	2,743,076.57
		119,351,655,52
	Less	
(3)	Revolving Management Accounts (EXHIBIT II - Page 2)	378,804.79
	Equals	
(4)	Total Pupil Costs (Exh. I)	118,972,850.73

RECOMMENDED METHOD FOR COSTS OF DELIVERING EDUCATIONAL SERVICES

a. ELIMINATIONS OF TOTAL PUPIL RELATED COSTS

'Total pupil related' costs were derived by eliminating the following expenditure items.

Key Code		
(5)	Total Furniture And Equipment Expenditures (EXHIBIT II - Page 4)	3,168,189.06

These expenditures included all items in excess of $10 and were never capitalized.

Key Code

(6)	Other Program Expenditures		
	(EXHIBIT II - Page 3)		48,153.82
(7)	Board of Education Expenditures		21,616.12
	(EXHIBIT II - Page 2)		
(8)	General Administration Items Not Directly Related To Delivery Of Educational Programs:		
	Research	(160,299.31 - 2,079.35)=	158,219.96
	Advanced Planning & Development	(464,620.26 - 176.74)	464,443.52
	Department of Information	(41,403.61 - 710.45)	40,693.16
	Department of Human Relations	(45,223,60 - 1,843.09)	43,380.51
(9)	School Facilities Building & Planning Activities		
	Planning (100,196.13 - 541.59)		99,654.54
	Site Acquisition (81,432.58 - 544.20)		80,888.38
	Construction (95,642.12 - 1,453.43)		94,188.69
	(EXHIBIT II - Page 2)		
(10)	Central Cafeteria Management		64,239.83
	(EXHIBIT II - Page 2)		
(11)	Proportion of Insurance And Federal Aid Associated With Non-Instructionally Related Activities		
	(4,506,993.63 - 416.02) * 0.00989	=	44,570.05
	(EXHIBIT II - Page 2) (NOTE #1)		
	Total Eliminations		4,328,237.64

b. ELIMINATIONS OF ALL BUT INSTRUCTIONALLY RELATED COSTS

Key Code			
(5)	Total Furniture And Equipment Expenditures	$ 3,168,189.06	
(14)	Personnel Services - Supporting Services		
	Office of Director - Salaries	35,593.37	
	- Other	6,458.32	
	Recruitment & Employment - Salaries	141,902.86	
	- Others	5,378.22	
	Classification, Conpensation and Records - Salaries	107,162.97	
	- Other	811.04	
(15)	Business And Financial Services - Salaries	6,693,419.91	
	- Other	6,469,857.04	
(16)	General Administration - Salaries - Total	1,350,446.99	
	- Less: Office of Supt.	- 202,232.41	
			$ 1,148,214.58
	Other - Total	$ 535,628.91	
	Less: Office of Supt.	- 18,265.26	
			517,363.65
	Add Back:		$ 18,294,351.65
	Fringe Benefits On Salary Component (NOTE #2)		- 3,684,364.30
	Total Eliminations		$ 14,609,986.72

5. RECOMPUTATION OF PER-PUPIL EXPENDITURE

	Total per-pupil expenditures	$ 118,972,850.73
	Less: Total Eliminations	- 14,609,986.72
	Total Instructionally Related Costs	$ 104,362,864.01
	Divided By	
Key Code		
(13)	ADM (Per Exhibit I) (NOTE #3)	124,535.00
	Per-pupil Expenditure - adjusted	$ 838.02
(12)	Per-Pupil Expenditure - unadjusted (Per Exhibit I)	$ 955.33
	Percent Reduction	12.2%

6. CONCLUSIONS

The case illustration reflects the fact that school systems have a vast number of areas of expenditure activity, and that many of these activities are not directly related to delivery of educational programs.

The exercise shows the extent of the adjustment procedures that may be required in order to get comparable instructionally related per-pupil costs for all LEA's.

NOTE # 1 (SEE EXHIBIT III) -

Percentage developed by eliminating:

a. supplemental retirement, retirees prior to 1-1-68

b. fire insurance;

c. other insurance,

d. fringe benefits on salaries and facilities rentals for hospital teaching, adult education and outdoor education programs;

e. proportion of fringe benefits (workman's compensation, FICA, employee benefit plan, retirement associated with salaries eliminated under items 3, 8, 9 & 10 above).

NOTE # 2 (Total Payroll Related Fringe)

(1.0-0.073)*4,429,876.57 = 4,106,495.58

(Per Exhibit III)

Fringe as % of Total Salaries e12#

$$\frac{4{,}106{,}495.58}{100{,}382{,}830.87} = .0401 \text{ a}$$

	Salaries - Total	$ 100,382,830.87
	Less Eliminations:	
14.	(35,593.37 + 141,902.86 + 107,162.97)	$ 284,659.20
15.		6,693,419.91
16.	(1,350,446.99 - 202,232,41)	1,148,214.58
	e11	$ 377,128.29
	Net Instructionally Related Salaries	$ 91,879,408.84 b
	Fringe Benefits on Instructionally Related Salaries (axb)	$ 3,684,364.30

NOTE # 3 Average daily membership (ADM) was used because it was available and is theoretically preferred. If this per-pupil expenditure was to be used in inter-district comparisons, ADA would have been used.

Schedule 11

COST PER PUPIL AND ENROLLMENT
FOR CURRENT FUND, SUPPORTED PROGRAMS FUND, AND DEBT SERVICE
YEAR ENDED JUNE 30, 1970

		Cost per Pupil Based on		
	Expenditures	A D A*	A D M**	Enrollment September 30
Current Fund and Supported Programs Fund expenditures distributed as follows:				
Kindergarten	$ 5,443,948.00	$ 615.85	$ 560.55	$ 562.04
Grades 1 to 6	53,158,711.00	956.21	903.95	906.43
Grades 7 to 12	60,370,192.00	1,188.20	1,077.73	1,065.88
Total	118,972,851.00***	1,032.38	955.33	952.00
Debt service distributed as follows:				
Kindergarten	541,673.00	61.28	55.77	55.92
Grades 1 to 6	5,289,292.00	95.14	89.94	90.19
Grades 7 to 12	6,007,912.00	118.25	107.25	106.07
Total	11,838,877.00	102.73	95.06	94.73
Grand Totals:				
Kindergarten	5,985,621.00	677.13	616.32	617.96
Grades 1 to 6	58,448,003.00	1,051.35	993.89	996.62
Grades 7 to 12	66,378,104.00	1,306.45	1,184.98	1,171.95
Total	$130,811,728.00	$1,135.11	$1,050.39	$ 1,046.73
Enrollment:				
Kindergarten		8,839.7	9,711.8	9,686.0
Grades 1 to 6		55,593.3	58,807.4	58,646.0
Grades 7 to 12		50,808.0	56,016.3	56,639.0
Total		115,241.0	124,535.5	124,971.0

* ADA Average Daily Attendance

** ADM Average Daily Membership

*** Excludes expenditures relative to revolving and management accounts

Schedule 2

STATEMENT OF BUDGET AND EXPENDITURES
YEAR ENDED JUNE 30, 1970

	Budget Excluding Transfers	Expenditures (including encumbrances)				Unencumbered Balances
		Salaries	Other	Furniture and Equipment	Total	
Current Fund (Note 1)						
Elementary and secondary schools:						
Instructional administration	$ 421,618.00	$ 416,628.58	$ 5,507.90	$ 2,828.28	$ 424,964.76	$ (3,346.76)
Elementary instruction	41,089,906.00	38,850,141.28	1,309,612.93	189,468.32	40,349,222.53	740,683.47
Secondary instruction	43,564,588.00	41,620,477.74	1,877,196.90	495,039.75	43,992,714.39	(428,126.39)
Elementary school plant operation	3,920,432.00	2,715,270.75	1,329,229.19	7,716.81	4,052,216.75	(131,784.75)
Secondary school plant operation	4,661,024.00	2,986,933.05	1,623,125.68	6,161.66	4,616,220.39	44,803.61
Administration of adult education	157,269.00	138,382.96	13,810.87	765.02	152,958.85	4,310.15
Special education	130,649.00	123,802.14	2,605.79		126,407.93	4,241.07
	93,945,486.00	86,851,636.50	6,161,089.26	701,979.84	93,714,705.60	230,780.40
Personnel services:						
Administration of personnel services	166,449.00	142,746.59	23,520.53	1,383.33	167,650.45	(1,201.45)
Office of director of professional personnel	43,219.00	29,861.82	11,982.41		41,844.23	1,374.77
Teacher personnel	193,972.00	168,472.61	11,704.67	2,368.51	182,545.79	11,426.21
Salary administration and records of professional personnel	115,669.00	112,311.84		1,362.60	113,674.44	1,994.56
Office of director of supporting services personnel	46,570.00	35,593.37	6,458.32		42,051.69	4,518.31
Recruitment and employment of supporting services personnel	141,873.00	141,902.86	5,378.22	1,653.37	148,934.45	(7,061.45)
Classification, compensation, and records of supporting services personnel	108,269.00	107,162.97	811.04	1,407.15	109,381.16	(1,112.16)
Office of director of staff development	49,414.00	33,816.80	9,648.40		43,465.20	5,948.80
Certification and career counseling	118,728.00	99,069.33	11,075.00		110,144.33	8,583.67
Program management	101,478.00	81,751.59	1,958.53	9,288.18	92,998.30	8,479.70
	1,085,641.00	952,689.78	82,537.12	17,463.14	1,052,690.04	32,950.96
Instructional and pupil services:						
Administration of instructional and pupil services	49,466.00	40,469.90	1,039.12	270.00	41,779.02	7,686.98
Office of director of pupil services	1,247,038.00	394,865.97	862,956.28	1,823.54	1,259,645.79	(12,607.79)
Pupil services area offices	1,278,776.00	1,345,431.98	30,560.08	3,331.19	1,379,323.25	(100,547.25)
Pupil and program appraisal	181,984.00	156,004.49	14,439.54	652.11	171,096.14	10,887.86
Office of director of educational media and technology	66,551.00	64,180.31	2,159.76		66,340.07	210.93
Instructional media	466,655.00	280,250.30	171,256.28	7,319.43	458,826.01	7,828.99
Processing services	248,120.00	196,592.40	27,140.53	2,164.95	225,897.88	22,222.12
Publications services	574,208.00	357,175.13	180,720.21	65,904.65	603,799.99	(29,591.99)
Instructional television services	115,619.00	82,441.58	28,829.68	9,332.09	120,603.35	(4,984.35)
Instructional technology	112,989.00	79,804.90	3,370.69	25,124.74	108,300.33	4,688.67
Supervision and curriculum development	1,261,621.00	1,160,292.44	46,493.15	2,713.35	1,209,498.94	52,122.06
	5,603,027.00	4,157,509.40	1,368,965.32	118,636.05	5,645,110.77	(42,083.77)

STATEMENT OF BUDGET AND EXPENDITURES
YEAR ENDED JUNE 30, 1970

Schedule 2
(Continued)

	Budget Excluding Transfers	Expenditures (including encumbrances) Salaries	Other	Furniture and Equipment	Total	Unencumbered Balances
Current Fund (continued)						
Business and financial services:						
Office of assistant superintendent of business and financial services	$ 64,715.00	$ 51,456.19	$ 7,506.51	$ 299.12	$ 59,261.82	$ 5,453.18
Budget office	125,788.00	94,021.51	7,840.67	2,809.09	104,671.27	21,116.73
Office services	485,500.00	201,207.17	264,758.17	9,168.19	475,133.53	10,366.47
Office of director of school facilities	74,191.00	70,470.64	416.48	814.26	71,701.38	2,489.62
Planning	108,757.00	99,235.99	418.55	541.59	100,196.13	8,560.87
Site acquisition	82,726.00	78,916.27	1,972.11	544.20	81,432.58	1,293.42
Construction	98,818.00	93,233.27	955.42	1,453.43	95,642.12	3,175.88
Maintenance	3,838,517.00	2,703,198.73	897,694.25	156,357.87	3,757,250.85	81,266.15
Office of director of school services	119,528.00	67,092.52	1,487.47	44,410.69	112,990.68	6,537.32
Building operations	130,609.00	114,634.90	1,049.34	380.00	116,064.24	14,544.76
Procurement	199,613.00	176,678.28	8,779.45	2,651.00	188,108.73	11,504.27
Supply management	303,710.00	277,775.17	34,513.79	13,463.00	325,751.96	(22,041.96)
Transportation	3,162,247.00	2,049,001.88	755,557.62	446,926.35	3,251,485.85	(89,238.85)
Central cafeteria management	90,698.00	38,684.43	25,555.40		64,239.83	26,458.17
Office of director of financial services	98,654.00	76,133.48	18,997.79		95,131.27	3,522.73
Accounting	234,546.00	223,978.37	325.00	2,417.24	226,720.61	7,825.39
Auditing	66,265.00	58,115.27	8,450.00	396.75	66,962.02	(697.02)
Insurance and federal aid	4,522,701.00	76,701.04	4,429,876.57	416.02	4,506,993.63	15,707.37
Payroll	131,443.00	142,884.80	3,702.45	868.91	147,456.16	(16,013.16)
	13,939,026.00	6,693,419.91	6,469,857.04	683,917.71	13,847,194.66	91,831.34
General administration:						
Office of superintendent	213,340.00	202,232.41	18,265.26	1,074.25	221,571.92	(8,231.92)
Research	189,551.00	154,752.81	3,467.15	2,079.35	160,299.31	29,251.69
Planning and development of federal and state programs	62,265.00	58,814.46	804.42		59,618.88	2,646.12
Office of director of educational and managerial information and analysis	1[illegible],856.00	34,067.47	10,170.83	176.74	44,415.04	90,440.96
Advance planning and development	[illegible],143.00	464,443.52		176.74	464,620.26	(402,477.26)
Systems design and programming	[illegible]4,707.00	298,973.92	499,453.34	4,406.93	802,834.19	(358,127.19)
Data processing and operations	[illegible]58,562.00	56,301.61	255.03	3,759.70	60,316.34	598,245.66
Department of information	59,101.00	39,072.36	1,620.80	710.45	41,403.61	17,697.39
Department of human relations	48,647.00	41,788.43	1,592.08	1,843.09	45,223.60	3,423.40
	1,873,172.00	1,350,446.99	535,628.91	14,227.25	1,900,303.15	(27,131.15)
Board of Education:						
Board members travel and supplies	19,700.00		21,616.12		21,616.12	(1,916.12)
Revolving and management accounts:						
Reimbursable use of school buildings	300,000.00	190,312.99			190,312.99	109,687.01
Field trips	110,000.00	150,690.90			150,690.90	(40,690.90)
Hospital teaching	30,800.00	36,124.40	1,676.50		37,800.90	(7,000.90)
	440,800.00	377,128.29	1,676.50		378,804.79	61,995.21

Schedule 2
(Continued)

STATEMENT OF BUDGET AND EXPENDITURES
YEAR ENDED JUNE 30, 1970

	Budget Excluding Transfers	Expenditures (including encumbrances)				Unencumbered Balances
		Salaries	Other	Furniture and Equipment	Total	
Current Fund (concluded)						
Total	$116,906,852.00	$100,382,830.87	$14,641,370.27	$1,536,223.99	$116,560,425.13	$ 346,426.87
Deduct:						
Transfers to Supported Programs Fund	526,826.77					526,826.77
Total budgeted programs	$116,380,025.23	100,382,830.87	14,641,370.27	1,536,223.99	116,560,425.13	$ (180,399.90)
Other programs:						
Medical examinations of bus drivers			3,843.50		3,843.50	
Tuition to other school districts			67.00		67.00	
Miscellaneous			44,243.32		44,243.32	
Total other programs			48,153.82		48,153.82	
Total Current Fund		100,382,830.87	14,689,524.09	1,536,223.99	116,608,578.95	
School Lunch Fund	$ 6,009,166.00	2,406,104.79	3,492,752.81	82,951.75	5,981,809.35	$ 27,356.65
Adult Education Fund	$ 217,246.00	220,412.78	24,308.14	436.83	245,157.75	$ (27,911.75)
Supported Programs Fund						
National Defense Education Act						
Title III			42,418.33	151,824.45	194,242.78	
Manpower Development and Training Act		107,759.71	25,888.15	607.12	134,254.98	
Economic Opportunity Act						
Title I B		49,180.18	5,058.32		54,238.50	
Title II A		300,001.01	150,602.12		450,603.13	
Adult Education Act		46,638.25	6,683.43	471.75	53,793.43	
Elementary and Secondary Education Act						
Title I		364,517.52	68,907.59		433,425.11	
Title II		34,739.65	184,753.37		219,493.02	
Title III		631,830.01	105,422.66	119,502.75	856,755.42	
Title VI		45,746.85	7,182.13	501.90	53,430.88	
Vocational Education Act		89,928.38	22,339.80	6,725.85	118,994.03	
Vocational Rehabilitation Act		21,604.17	2,712.70		24,316.87	
Education Professions Development Act, Title V			31,122.45		31,122.45	
Special Grants		51,290.42	8,982.73	816.98	61,090.13	
Other Grants		41,526.96	12,101.36	3,687.52	57,315.84	
Total Supported Programs Fund		1,784,763.11	674,175.14	284,138.32	2,743,076.57	

STATEMENT OF BUDGET AND EXPENDITURES
YEAR ENDED JUNE 30, 1970

Schedule 2
(Concluded)

	Budget Excluding Transfers	Expenditures (including encumbrances)				Unencumbered Balances
		Salaries	Other	Furniture and Equipment	Total	
School Construction Fund						
Land	$	$	$ 354,394.25	$	$ 354,394.25	$
Buildings and additions:						
Architects' fees			1,287,254.97		1,287,254.97	
Contractors			14,233,147.88		14,233,147.88	
Inspectors		340,925.94			340,925.94	
Other			1,178,959.52		1,178,959.52	
Furniture and equipment				1,264,438.17	1,264,438.17	
Sites for future schools (Note 2)			1,267,501.65		1,267,501.65	
Total School Construction Fund (Schedule 3)		340,925.94	18,321,258.27	1,264,438.17	19,926,622.38	
Employee Benefit Trust Fund						
Other programs:						
Premiums, Group Hospitalization, Inc.			1,860,230.07		1,860,230.07	
Premiums, John Hancock Life Insurance Co.			1,018,401.75		1,018,401.75	
Refunds and miscellaneous			6,206.31		6,206.31	
Loss on sale of securities			95,254.07		95,254.07	
Total Employee Benefit Trust Fund			2,980,092.20		2,980,092.20	
Independent Activity Funds in Schools (Note 3)						
Other programs:						
Athletics			477,333.00		477,333.00	
Publications			240,663.85		240,663.85	
Class activities			594,790.42		594,790.42	
Club activities			281,515.03		281,515.03	
General			782,049.30		782,049.30	
Miscellaneous			1,353,249.86		1,353,249.86	
Total Independent Activity Funds in Schools			3,729,601.46		3,729,601.46	
Total All Funds (Exhibit B)		$105,135,037.49	$43,911,712.11	$3,168,189.06	$152,214,938.66	

FIXED CHARGES

		FY 1972		FY 1971	
		Item	Object		
.04 Other		$	$6,979,599	$6,156,580	d1
Insurance and Fixed Charges:					
Workman's compensation*		345,008		272,748	
Employer's contribution for social security*		1,008,157		814,174	
Employee benefit plan*		2,202,702		2,046,234	
Retirement		2,679,555		2,338,870	
Supplemental retirement, retirees prior to 1-1-68		57,000		50,000	a
Fire insurance		217,010		216,050	b
Other insurance Includes football, automobile, truck, boiler, personal property, general liability, fidelity bond, and robbery. Reduction due to three year boiler coverage paid in FY 1971.		129,377		154,000	c
Hospital Teaching Fringe benefits		2,285			
Adult Education Fringe benefits - $18,555 Rental of buildings - $3,000		21,555			
Outdoor Education Rental of facilities		29,200		29,200	d
ELIMINATIONS:			a	50,000	
			b	216,050	
			c	154,000	
			d	29,200	
e	e1	99,236	h1	449,250	
	e2	78,916			
	e3	93,233			
	e4	38,684			
	e6	5,600			
	e7	154,753			
	e8	64,444			
	e9	39,072			
	e10	41,788			
	e11	377,128			
	n2	992,854	n2		
	e12	100,382,831	d2		

$$n1/d1 = \frac{449250}{6156580}^{.073} * 76701^{e5} =$$

$$n2/d2 \; \frac{992,854}{100,382,831} = \underline{\underline{0.00989}} \text{ (NOTE \# 1)}$$

*Increases due to rate changes.

EXHIBIT III

B. A STATISTICAL APPROACH TO THE CLASSIFICATION OF SCHOOL DISTRICTS ACCORDING TO EXPENDITURE RELATED CHARACTERISTICS

The Problem

In a previous section we have illustrated the fact that various elements of per-pupil expenditure tend to vary to a greater or lesser extent upon different sets of school district characteristics. But even the most recent sophisticated attempts at school district classification have not addressed themselves to this easily observable phenomenon. In many of these studies, per-pupil expenditure has been treated as a single statistic. In other cases, single classification criteria (such as metropolitan status categories, enrollment size intervals, grade levels or community wealth gradations) have been used uniformly across all expenditure elements. Occassionally two-way classification schemes have been applied. For the most part these attempts at classification have not been reliable enough to explain the variability that exists in intra-school district per-pupil expenditure comparisons.

Further weaknesses in most of these attempts at classification have to do with the arbitrary way in which stratifications or gradations of classification criteria were chosen. For instance, in Mueller's work on distribution of educational resources in the state of Delaware he divides school districts into five categories: Central City; suburban districts; cities over 10,000; cities under 10,000 and rural. The J. Alan Thomas' report on equal educational opportunity in Michigan uses various a priori individual classification criteria stratified in a uniform way when comparing school districts data. The general classification criteria most often used are per-pupil expenditure strata, membership size strata, regional groupings. A comprehensive study of intra district fiscal capacity and educational finance variations used metropolitan status as its only classification criteria. This criteria was set out in seven strata: major urban core city, minor urban core city; independent city, established suburb; developing suburb, small city; small town or agricultural service center.

The National Center of Educational Statistics of the U. S. Office of Education uses three categorization criteria for classifying school districts current per-pupil expenditures:

Enrollment size - 5 strata;

Metropolitan status - 3 strata,

(Metropolitan central, metropolitan other, non-metropolitan);

Region - 4 strata;

(North Atlantic, Great Lakes & Plains, Southeast, West and Southwest)

As can be seen from these presentation there is quite a difference in professional judgment being exercised in determining in an a priori way just what kind of school district classification scheme is meaningful. As one analyzes more attempts at a priori classification and analyzes the ambiguities in interpreting the results it becomes increasingly apparent that such attempts at classification should be subjected to tests of statistical significance. The next section deals with a recent attempt at doing this and offers some insights for extended work in this area.

A Promising Approach

Archie A. Buchmiller conducted an analysis of 1967-68 expenditures in Wisconsin K, 1 - 12 school districts for the purposes of developing an "expenditure index". Buchmiller hoped to build this index in such a way as to properly reflect school districts' differentials as relates to varying "educational components" and"related services" being provided. Buchmiller included 371 school districts in his analysis. These districts accounted for 94% of the professional staff and pupil membership. Instead of examining one per-pupil expenditure statistic, he examined twenty four per-pupil expenditure variables:

1. Salaries of Administration
2. Other Administrative Expenses
3. Salaries of Principals and Supervisors
4. Salaries of Teachers
5. Other Professional Salaries
6. Clerical and Miscellaneous Salaries
7. Textbooks and Instructional Suppiies
8. Audio-visual Materials, Periodicals and Library Books
9. Other Instructional Expenses
10. Attendance
11. Health
12. Transportation
13. Operation
14. Maintenance of Instructional Equipment
15. Other Maintenance
16. Fixed Charges
17. Debt Service
18. Capital Outlay for Instructional Equipment
19. Other Capital Outlay
20. Community Services
21. School Lunch
22. Student Activities
23. Federal Expenditures
24. Net Operating Cost

The purpose of Buchmiller's analysis was to seek answers to several questions. The question most germain to the classification problem was stated in his paper as follows:

> "Is it more meaningful and equitable to compare school districts by classifying these districts into membership size groups rather than using a single group of all districts?"
>
> and
>
> "Can the school district financial accounting categories now used be grouped into meaningful expenditure descriptors to provide cost information?"

(NOTE: The need for attempting to answer the question relating to "expenditure descriptors" becomes obvious when one considers the fact that twenty four expenditure variables were being examined.)

The approach used by Buchmiller in answering these questions is significant in that it was designed to eliminate the apparent weaknesses of previous classification attempts.

First of all, classification criteria were selected on an a priori basis and then refined judgmentally and statistically.

The a priori classification criteria chosen by Buchmiller was school district pupil membership. He established five a priori membership strata. He then developed descriptive statistics and correlative statistics for all 24 expenditure variables and "meaningful" changes in the level of per-pupil expenditures between a priori groupings were observed. He judgementally reduced the five strata to three. He then tried to test the adequacy of these groupings statistically through the application of a modified discriminant function analysis. This approach attempted to determine whether a single composite cost variable (such as net operating cost) could be used to obtain alternative size groupings.

Although the approach Buchmiller used in this instance did not lead to any further changes in groupings, other results may have been obtained if other analysis of variance techniques had been applied. It should be noted that Buchmiller used only one composite variable in its original form. He could have used other sets of cost variables in any of a variety of transgenerated forms. Buchmiller did however try to develop cost composites. He applied factor analysis to the 24 per pupil expenditure variables and obtained 6 factors. These factors (management; instructional salaries; instructional supports; acquisition of facilities and equipment; institutional operations and services) explained 55.6% of the total variance of the 24 expenditure variables. Although numerical complexity reduced, Buchmiller admitted that interpretive complexity was increased. This led him to conclude that the "membership" classification may not have been sufficient and that other school district characteristics (such as rural - urban location, wealth, organizational complexity etc.) may have had to be used as well.

Buchmillers work does not negate the applicability of analysis of variance techniques to establish meaningful groupings. It only highlights the need for more experimentation.

For instance, two way and three way analysis of variance designs could have been applied if the number of districts data were sufficient. In addition, analysis of variance technology provides the researcher with the opportunity to remove controllable sources of variation (such as variations in committed cost) from the data prior to testing significance of grouping criteria. If such groupings of school districts were obtained for "principal components" of per-pupil expenditure it would then be possible to estimate expected ranges of expenditure components for "like" school districts and determine those school districts that are materially under or over providing certain educational inputs. This kind of comparative framework could provide insights in developing more meaningful bases for allocating funds to school districts.

C. A 'STANDARDS' APPROACH

THE DETERMINATION OF DISPARITIES IN PARTICULAR FUNCTIONAL COMPONENTS OF EDUCATIONAL EXPENDITURE

PURPOSE

In previous sections we discussed the methodologies which could be applied to develop groupings of 'like' school districts for each 'functional component' of per-pupil expenditure. We then alluded to the possibility of developing a 'comparative framework' to determine those school districts which are materially under-providing or over-providing certain educational inputs. We had suggested that such a comparative framework could provide insights in developing more meaningful bases for allocating funds to school districts.

In this section we have developed a model of such a comparative framework for measuring such disparities. We also have illustrated the workings of this 'model' through the use of a case study.

DESIGN LIMITATIONS

Any approach to the making of comparisons assumes the existence of base criteria from which comparisons can be made. These base criteria are sometimes referred to as 'standards'. The development of meaningful standards can take many forms. They can be engineered or designed from planned activity or ongoing activity that can be measured. They also can be derived through averaging the experiences of those being measured. Because of time limitations we have collected a set of state-wide averages and applied them as 'standards' to all school districts which were used in developing these averages. In addition we made certain assumptions as to particular standards that were not available.

The comparative framework which we developed is based upon cost accounting variance isolation methodology. It is not meant to be an exhaustive variance isolation mechanism. It is designed to accommodate the case study data made available and to isolate only the most important components of disparity in per-pupil expenditures.

FUNCTIONAL COMPONENTS INCLUDED FOR ANALYSIS

The functional components of per-pupil expenditure which were subjected to the variance isolation methodology were -

teacher salary expenditur
principal, supervisor and administrator salary expenditures;
other instructional staff salaries expenditures;
other instructional costs expenditures;
transportation expenditures, and
plant operation and maintenance expenditures.

An additional variance analysis was performed on the instructional component of Title I - Disadvantaged Programs.

Certain variance analyses were not developed for such functional categories as - attendance, health, fixed charges, food services and other charges because of their ambiguous nature.

Administrative salaries were combined with principals and supervisors because consistent staffing breakdowns did not exist.

No attempt to treat occupancy costs was made in this study because of lack of data on cost in place and age of facilities.

DATA OBTAINED

The basic information obtained for each district in the state was as follows:

1. Average teachers' salaries
2. Number of teachers
3. Number of pupils
4. Number of other instructional personnel (librarians, guidance counsellors, other)
5. Number of principals, administrative personnel and supervisory personnel
6. Other instructional staff expense per pupil (librarians, guidance, other)
7. Other instructional costs per pupil (clerical, textbooks, school supplies, other)
8. Principal, supervisor and administrator expense per pupil
9. Transportation expense per pupil
10. Plant operation and maintenance expense per pupil
11. Local bonded debt per pupil
12. School building assessed valuation per pupil
13. Number of Title I teachers
14. Number of black and low-income whites enrolled.

The same data was detailed in weighted average form for central cities, cities over 10,000, cities under 10,000 and rural areas and for the state. Because there were only 23 school districts in the state the state-wide averages were used as the 'standards.' (In lieu of averages for above mentioned metropolitan status categories).

MODIFICATION OF INPUTS

The data obtained was modified to develop the following input variables both by district and statewide:

1. Number of teachers per pupil;
2. Average salary per teacher;
3. Ratio of 'supervisory' to teachers;
4. Average 'supervisory' salary;
5. Ratio of other instructional staff to teachers;
6. Average of other instructional salary;
7. Other instructional cost per pupil;
8. Percentage of pupils transported *1/
9. Transportation expense/pupil transported *2/
10. Ratio of local bonded debt to school building assessed value;
11. Functional relationship between plant operation and maintenance expenditures (y) and local bonded debt (x_1) and school building assessed valuation (x_2) *3/
12. Special program teacher requirement (based on staffing factors obtained from McLure study mentioned in Section 2.5.1

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*1/ Percentage of pupils transported was developed by assuming 50% transported statewide, and by adjusting this percentage to each district using the ratio of each district's transportation cost/pupil to the statewide avg.
*2/ Transportation expense per pupil transported was computed by-(1) doubling the statewide transportation cost per pupil to get cost/pupil transported;(2) Adjusting it to each district on the ratio of their average instructional salary. (Note: used to get cost of living differential).
*3/ A regression was run and the following results were obtained:
$Y = 51.86 + .009X_1 + 11.94 (X_1/X_2)$

THE VARIANCE ISOLATION LOGIC - DEFINITIONS

TEACHER EXPENDITURE VARIANCES

Teacher expenditure variances were divided into two subcomponents -

A teacher staffing variance, and

A teacher salary schedule variance.

The teacher staffing variance measures the differences between actual district teaching expenditures that would have been incurred if a 'standard' student-teacher ratio had been maintained but prevailing average district salary had been used.

The teacher salary level variance compares the expenditres at 'standard' staffing levels if 'actual' and 'standard' salary levels were in effect. (NOTE: Because age and experience levels were not available rate differentials were expressed using average salary levels.)

The total of these two variances described differences between a district's actual staffing and salary practices as against some 'standard' staffing and salary practice. Due to differences between statewide and districtwide teacher populations were reflected in this variance.

SUPERVISORY EXPENDITURE VARIANCES

Supervisory expenditure variances were divided into three subcomponents -

A supervisory staffing mix variance,
An instructionally related supervisory staffing variance, and
A supervisory salary schedule variance.

The supervisory staffing mix variance measures the expenditure differentials between actual supervisory expenditures and that which would have been expended at actual rates if the 'standard' ratio of supervisory personnel to teachers was maintained.

The instructionally related supervisory staffing variance measures that portion of total supervisory expenditure variance associated with differences in pupil-teacher ratios if standard supervisory personnel to teaching personnel had been maintained (and paid at actual rates).

The 'supervisory' level schedule variance measures the dollar differences of 'standard' supervisory staffing levels when costed out at actual and 'standard' salary levels.

The total of these three variances describes differences between a district's actual supervisory staffing and salary practices as against some 'standard' staffing and salary practice.

OTHER INSTRUCTIONAL STAFF EXPENDITURE VARIANCES

Other instructional staff expenditure variances were divided into three subcomponents -

A staffing mix variance,
An instructionally related staffing variance, and
A salary level variance.

These three sub-variances are similar in makeup to those mentioned under 'supervisory' expenditure variances.

OTHER INSTRUCTIONAL COST VARIANCE

This variance measures the dollar difference between what was actually spent by the district against what would have been spent if 'standard' per-pupil expenditures were made.

TOTAL INSTRUCTIONAL COST VARIANCE

This variance is the sum of all of the above-mentioned variances.

TRANSPORTATION EXPENDITURE VARIANCE

Transportation expenditure variances were divided into two subcomponents -

A transportation efficiency variance, and
A transportation effort variance.

The transportation efficiency variance measures the difference between the actual cost of pupils transported and the 'standard' cost of transporting the same number of pupils.

The transportation effort variance measures the dollar difference associated with transporting more or less than the 'standard' percentage of pupils enrolled. It is costed out at 'standard' rates.

The total of these two variances described the differences between actual transportation expenditures and a 'standard' equivalent based on unit operating costs and transportation program size.

PLANT OPERATION AND MAINTENANCE EXPENDITURE VARIANCE

The plant operation and maintenance expenditure variances were divided into two sub-components -

An efficiency variance, and
A facilities differential variance.

The efficiency variance measures the difference between actual expenditures for plant operation and maintenance and an estimate of that cost considering the age and worth of school buildings to be maintained.

The facilities differential variance measures the difference between what it should cost to maintain the district's school buildings, at 'standard' and what it would cost if the 'standard' complement of facilities were available to that district. This variance should highlight needs in the capital outlay area.

The total of these two variances depict the difference between what is actually being spent by the district on plant operations and maintenance and what it should cost if that standard amount of operations and maintenance expenditures were made in support of a 'standard' mix of facilities.

PROGRAM ENROLLMENT EXPENDITURE VARIANCE

This variance isolation scheme is useful in comparing all elements of expenditure which are identifiable to a specific program such as -

Vocational,
Compensatory (disadvantaged),
Bi-lingual,
Specially gifted, and
The handicapped.

It would also apply to the expenditure portions of health, food services, community services, adult education, etc.

Because of data limitations the variance isolation logic used in this example was limited to the staffing portion of a compensatory program. As such two subcomponents of the program enrichment variance were identified -- a staffing variance, and a salary schedule variance.

The staffing variance measures the difference between the actual salary expenditures made on those full-time equivalent staff assigned to the program and the amount that would have been expended (at actual rates) to support a standard staffing level (based on program type and target population site).

The salary level variance measures the dollar difference that may exist at standard program staffing levels when the actual and standard salary levels are incurred.

The total of these two variances describe the actual program staff expenditures and 'standard' staff expenditure required.

VARIATION ISOLATION LOGIC

A SAMPLE COMPUTATION*

A major central city school district was used in comparison to the state-wide 'standards.' The summary of the variations found were as follows:

	$ Per Pupil	
Teacher-staffing variance	$ 39.51	
Teacher salary level variance	28.24	
Teacher expenditure variance - total		$ 67.75
Supervisory staffing mix variance	$ 32.21	
Supervisory instructionally related staffing variance	4.98	
Supervisory salary level variance	- 8.18	
Supervisory expenditure variance - total		29.00
Other instructional staff - staffing mix variance	$ 2.95	
Other instructional - instructionally related staffing variance	1.76	
Other instructional staff - salary level variance	- 7.71	
Other instructional staff - expenditure variance - total		- 3.00
Other instructional cost variance		2.00
Total Instructional cost variance		$95.75

---

*NOTE: A complete description of the inputs formulae and output of all 23 districts within this state are appended.

	$ Per Pupil
Transportation efficiency variance	- $24.70
Transportation effort variance	- 17.21
Transportation expenditure variance - total	- $ 7.48
Plant operation and maintenance efficiency variance	$ 14.14
Plant operation and maintenance facilities differencial variance	.32
Plant operation and maintenance expenditure variance - total	$ 14.46
Program enrichment staffing variance	- $449.38
Program enrichment salary schedule variance	33.33
Program enrichment expenditure variance - total	- $416.05

SIGNIFICANT FINDINGS FROM SAMPLE COMPUTATION

This school district is spending less than standard on supervisory and other instructional staff salaries but at the same time it employs more than the standard complement of all instructionally related categories. It does however, maintain a significantly higher teacher salary level and a significantly higher teacher staffing level.

As far as transportation expenditures are concerned this central city district spends significantly less than the rest of the state at no great sacrifice in efficiency.

This school district spends considerably more on plant maintenance and operations. A considerable part of this is due to urban factors but not age of facilities in use.

Finally, the compensatory programs are not sufficiently staffed and if they were, a sizable additional amount would be required if average teacher salaries for the district were to be maintained and all target populations served.

CONCLUDING REMARKS

As can be seen in our model, there are insights to be gained just from the study of the resulting patterns of variances. These insights should assist those who are looking to bring about more equitable distribution of educational inputs. Insights are present for determining which school districts have to pay more to deliver essentially the same program and which districts are not able to do more in delivering specific types of educational programs. When per-pupil expenditure information can be presented in a way which -

1) compares 'like' school districts, and
2) analyzes each district's significant per-pupil expenditure components against 'like' district standards,

then it makes it possible to implement revised expenditure programs which have a better chance at delivering equal educational opportunities to greater numbers of children.

APPENDIX TO SECTION C

MEASURING OF DISPARITIES IN PER-PUPIL EXPENDITURE MAKEUP BETWEEN SCHOOL DISTRICTS IN THE STATE OF DELAWARE - A CASE STUDY

PURPOSE:

Section III C of this report included the following topics: A description of the purpose, the designed limitations; the principal components analyzed; the data input; modifications to the data input; variance isolation logic employed; and, an example of its computation.

> The purpose of the appendix to Section III C is to provide: Documentation of the complete set of data input which was used; a full description of the computational formula employed to develop the data analysis; and a complete data analysis for all districts within the State of Delaware.

In addition we have attempted to interpret the results of the inter-district comparisons in light of probable causes. Comparisons are then made to conventional per-pupil expenditure interpretations in order to show how much more meaningful this suggested analytical methodology is in measuring disparities in educational input.

EXPLANATION OF EXHIBIT I

VARIANCE ISOLATION CASE STUDY DATA

Exhibit I includes 15 items of input which were gathered for each school district in the State of Delaware. Also included were weighted average inputs for districts in suburbs, cities over 10,000, cities under 10,000 and rural areas. The city of Wilmington was not included in the cities over 10,000 category but was analyzed separately. In order to conduct the analysis of disparities we modified the 15 input items to be more reflective of the actual way which these expenditures are budgeted and incurred.

Teachers' Salaries

We used statistics reflecting the fractional number of teacher per pupil and the average salary per teacher to reflect differences in both class size and salary level being incurred. The salary level component of teacher expenditures should normally have been further decomposed to reflect such factors as the age and experience level of the teaching population employed and the salary schedule that was in effect in the district. This wasn't done in this study because such information was not availble. Accordingly, our analysis averages out these variations because average salary per teacher component was used.

Other Instructionally Related Costs

Administrative supervisory and other instructional support staffing was converted from a per pupil basis into a functional base dependent upon the number of teachers employed. This procedure was adopted because of our belief that administrative and other staff support services are more often budgeted in relation to the size of teaching staffs not in relation to the number of pupils enrolled.

However we felt that other instructional costs(which included such things as clerical supplies, text and other teaching supplies) were more approximately expressed on a per-pupil expenditure basis.

Transportation Expenditures

Transportation expense per pupil was decomposed and re-expressed as a function of the percentage of per pupils transported and the cost per pupil transported. Ideally, we should have liked to use such statistics as the number of pupils miles provided and the cost per pupil mile. In the data provided us, we were not able to obtain the specific numbers of pupils transported in the districts. However, we made an assumption that 50 percent of the pupils in average daily attendance in the state were transported. We made slight variations to this assumption in the various classes of districts in order to illustrate the methodology. These variation assumptions were made by considering the actual level of transportation expense per pupil actually incurred in a particular district and by assuming that the transportation cost per pupil transported was relatively constant across all districts.

Plant Operation and Maintenance Expenditures

Plant operation and maintenance expenditures were described in our analysis as a function of local bonded debt and school building assessed valuations. This function was chosen because of limited data available to us. Logically, it would seem that plant operation and maintenance expenditures would best relate to (1) age of buildings, (2) number of buildings, and (3) type of buildings. To properly 'type' building, one would have to identify such characteristics as construction materials, size, type of heating and/or air conditioning. High cost of operating facilities such as swimming pools and the like, would also have to be identified. In addition occupancy information would be needed. Because this descriptive information was lacking we believe that the analysis we performed of plant operations and maintenance expenditures was somewhat superficial.

Program Expenditures

Our program enrollment expenditure variance calculation was limited to identifying the differences in staff requirements for given target populations. These differences were computed by comparing actual and 'standard' salary levels and actual 'standard' program staffing levels. In this study we had information concerning numbers of Title I teachers identified. This gave us our actual staffing level. We also were able to obtain totals on black and low-income white target populations (which were not necessarily the Title I populations reported). We assumed, for illustrative purposes, that compensatory programs would require 1.4 times the standard pupil-teacher ratio required for a 'basic' grades (1-6) program. This factor was taken from

EXHIBIT I

VARIANCE ISOLATION CASE STUDY DATA *

School Districts	Average Total Teachers Salaries	# of Teachers	# of Pupils (ADA)	# of Instr. Person. Lib/Guid/ Other	# Admin., Supervisory, Principal	Other Instr. Cost/Pupil Clerical/texts/ Supplies/other
Wilmington	9666	641	13748	48	59	47
New Castle	9041	270	6184	16	14	42
Claymont	9082	140	3162	10	10	36
Conrad Area	9390	257	5861	16	8	42
De La War	8666	189	4001	10	9	30
Alexis I Dupont	9343	118	2595	8	12	83
Alfred I Dupont	10053	429	9369	33	24	64
Marshallton - McKean	9658	138	3363	4	6	46
Mt. Pleasant	10328	238	5213	14	14	44
Stanton	9577	270	6199	22	16	47
Newark	9004	583	13100	46	28	34
Dover	8405	253	5754	17	23	43
Lake Forest	8238	125	2757	6	4	41
Milford	7948	147	3549	11	7	42
Smyrna	8303	111	2531	5	7	38
Caesar Rodney	7849	0	4809	0	0	42
Appoquinimink	8381	93	2226	4	6	42
Delmar	8326	28	584	2	0	23
Indian River	8204	228	5548	13	10	40
Laurel	8007	89	1963	3	6	59
Cape Henlopen	8616	146	3354	8	5	45
Seaford	8078	158	3507	10	6	34
Woodbridge	7986	82	1889	3	4	43
Central Cities	9666	641	13748	48	59	47
Suburbs	9460	2049	45947	133	113	49
Cities over 10,000	8705	836	18854	63	51	37
Cities under 10,000 & Rural	8176	1207	32717	65	55	43
State Total	9002	4733	111266	309	278	45

William McLure's study on staffing requirements for compensatory programs. Ideally, program expenditure variance should include more information than just target populations present and projected. It should also include information relating to differentiated staffing requirements and associated salary structures required. In addition, information concerning the instructional equipment and other related instructional costs should be included in the expenditure variation analysis. Because of the above mentioned data limitations we feel this portion of the analysis was valuable only in so far as it illustrates how variance isolation methodology can be used in this context.

EXHIBIT I

VARIANCE ISOLATION CASE STUDY DATA *

School Districts	Instr. Staff Exp/Pupil Lib/guid other	Princ., Supr., Admin. Exp/ Pupil	Transp. Exp/ Pupil	Plant Opera.& Maint. Exp/ Pupil	Local Bonded Debt/ Pupil	School Bldg. Assessed Val. Per Pupil	Title I Teachers	Black & Low Income White	Total Operat. Expend. Per Pupil
Wilmington	23	89	7	93	454	2783	51	11589	792
New Castle	24	46	19	66	835	3076	27	496	578
Claymont	33	46	5	80	901	1993	2	155	621
Conrad Area	19	53	13	65	461	2212	14	273	601
De La War	36	49	16	69	503	2794	22	1864	631
Alexis I Dupont	42	116	57	126	2163	5389	0	0	915
Alfred I Dupont	50	62	26	92	958	2295	0	59	738
Marshallton - McKean	10	65	29	73	422	2881	3	194	650
Mt. Pleasant	38	56	17	80	485	3648	1	49	736
Stanton	24	79	34	85	927	3047	1	219	670
Newark	28	57	36	61	774	3477	13	528	613
Dover	22	61	37	90	550	2786	9	1504	679
Lake Forest	19	51	40	65	421	1065	6	425	573
Milford	23	47	39	69	259	1709	12	855	554
Smyrna	23	46	38	70	884	2488	17	520	579
Caesar Rodney	5	48	46	59	758	1224	39	1210	574
Appoquinimink	8	55	58	76	237	2644	10	0	599
Delmar	0	58	80	101	330	2632	0	0	700
Indian River	6	42	53	82	220	2231	37	1652	574
Laurel	45	65	48	91	166	1754	9	802	681
Cape Henlopen	15	51	33	89	209	1839	1	728	617
Seaford	31	45	48	77	496	2653	16	1080	602
Woodbridge	0	41	43	71	205	3606	0	676	546
Central Cities	23	89	7	93	454	2783	51	11589	792
Suburb	32	62	23	78	806	2737	70	3475	678
Cities over 10,000	26	58	36	70	706	3266	22	2026	636
Cities under 10,000 & Rural	19	49	46	88	399	2120	147	8006	603
State Total	26	60	30	80	626	2651	290	25096	659

EXPLANATION OF EXHIBIT II
COMPUTATIONAL FRAMEWORK

Symbols for the actual variable names employed appear adjacent to variables definition.

- Symbols to be noted with a capital 'S' were used to describe standards.
- Symbols denoted with a capital 'A' are used to describe actual inputs.
- Symbols denoted with a lower case 'p' are used to denote input parameters.
- Symbols denoted with a lower case 't' are used to denote total cost calculations.
- Symbols denoted with a capital 'V' are used to denote variances for differences between pairs of lower case t's.

For instance:

$$t_1 = A_1 * A_2 * p_1;$$
$$t_2 = S_1 * A_2 * p_1;$$
$$V_1 = t_1 - t_2.$$

Where:

A_1 = the actual number of teachers per pupil

A_2 = the actual average salary per teacher

S_1 = the standard number teachers per pupil

p_1 = the number of pupils in average daily attendance

t_1 = the actual teaching expenditures

t_2 = the standard instructional drafting requirement cost at actual salary levels

V_1 = teacher staffing variance

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V1) + (V2) = (V3)

TEACHER STAFFING VARIANCE		+	TEACHER SALARY LEVEL VARIANCE		=	TOTAL TEACHER EXPENDITURE VARIANCE
(A1)	(S1)			(S1)		
Actl. # Teachers/ 1000 Pupils	Std. # Teachers/ 1000 Pupils			Std. # Teachers/1000 Pupils		
(A2)	(A2)			(S2)		
Actl. Avg. Salary/ Teacher	Actl. Avg. Salary; Teacher			Std. Avg. Salary/Teacher		
(p)	(p)			(p)		
Actl. # Pupils (000)	Actl. # Pupils (000)			Actl. # of Pupils (000)		
=	=			=		
Actl. Teaching Expenditures	Std. Instructional Staffing @ Actual cost			Std. Teaching Expenditures		
(t1)	(t2)	→	(t2)	(t3)		

(V1 = t1 - t2)

(V2 = t2 - t3)

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V4)		+	(V5)		+	(V6)		=	(V7)
Principals & Supervisors Staffing Variance		+	Instructionally Related Superv. Staffing Variance		+	Superv. Salary Level Variance		=	Total Principals & Supervisors Expenditure Variance
(A3) Actl. # Superv/ Teachers	(S3) Std. # Superv./ Teacher		(S3)	(S3) Std. # Superv/ Teacher		(S3)	(S3) Std. # Superv./ Teacher		
*	*		*	*		*	*		
(A4) Actl. Avg. Supervisory Salary	(A4) Actl. Avg. Superv. Salary		(A4)	(A4) Actl. Avg. Superv. Salary		(A4)	(S4) Std. Avg. Superv. Salary		
*	*		*	*		*	*		
(A1) Actl. # Teacher/ 1000 Pupils	(A1) Actl. # Teachers/ 1000 Pupils		(A1)	(S1) Std. # Teachers/ 1000 Pupils		(S1)	(S1) Std. # Teachers/ 1000 Pupils		
*	*		*	*		*	*		
(p1) Actl. # Pupils = (000)	(p1) Actl. # Pupils (000)		(p1)	(p1) Actl. # Pupils		(p1)	(p1) Actl. # of Pupils = (000)		
			=	=		=			
Actl. Prin. & Superv. Exp.	Std. Superv. Staffing at Actl. Teaching Staff Levels & Costs			Std. Superv. Staffing at Std. Teach. Staff Levels and Actl. Costs			Std. Supervisory Expenditures		
(t4)	(t5)	→	(t5)	(t6)	→	(t6)	(t7)		
(V4 = t4 - t5)			(V5 = t5 - t6)			(V_6 = t6 - t7)			

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V8)		+ (V9		+ (V10)		= (V11)
Other Instructional Staff Mix Staffing Variance		+ Instructionally Related	OIS Staffing Variance	+ OIS Salary Level Variance		= Total Other Instructional Staff Expenditure Variance
(A5) Actl. OIS/ Teachers	(S5) Std. # OIS/ Teacher	(S5)	(S5) Std. # OIS/ Teacher	(S5)	(S5) Std. # OIS/ Teacher	
*	*	*	*	*	*	
(A6) Actl. Avg. OIS Salaries	(A6) Actl. Avg. OIS Salary	(A6)	(A6) Actl. Avg. OIS Salary	(A6)	(S6) Std. Avg. OIS Salary	
*	*	*	*	*	*	
(A1) Actl. #Teachers/ 1000 Pupils	(A1) Actl. # Teachers/ 1000 Pupils	(A1)	(S1) Std. # Teachers/ 1000 Pupils	(S1)	(S1) Std. # Teachers/ 1000 Pupils	
*	*	*	*	*	*	
(p1) Actl. # Pupils (000)	(p1) Actl. # Pupils (000)	(p1)	(p1) Actl. # Pupils (000)	(p1)	(p1) Actl. # Pupils (000)	
=	=	=	=	=	=	
Actl. OIS Expenditures	Std. OIS Staffing @ Actual Teach. Staff Levels & Costs		Std. OIS Staffing at Std. Teach. Staff Levels and Actl. Costs		Std. OIS Expenditures	
(t8)	(t9) ⟶	(t9)	(t10) ⟶	(t10)	(t11)	
(V8 = t8 - t9)		(V9 = t9 - t10)		(V10 = t10 - t11)		

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V12)		=	(V13)
Other Instructional Cost Variance			
(A7)	(S7)		
Actl. Other Instr. Cost/ Pupil	Std. Other Instr. Cost/Pupil	=	Total Other Instructional Cost Variance
*	*		
(p1)	(p1)		
Actl. # Pupils	Actl. # Pupils		
=	=		
Actl. Other Instructional Costs	Standard other instructional costs		
(t12)	(t13)		

(V12 = t12 - t13)

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V3)
Total Teacher
Expenditure Variance

+

(V7)
Total Principals &
Supervisors
Expenditure
Variance

+

(V11)
Total Other Instructional
Staff Expenditure
Variance

+

(V13)
Total Other Instructional
Cost Variance

=

(V14)
Total Instructional
Cost Variance

EXHIBIT II - COMPUTATIONAL FRAMEWORK

TRANSPORTATION EFFICIENCY	VARIANCE	+	TRANSPORTATION EFFORT VARIANCE	=	Total Transportation Expenditure Variance
(A10)	(A10)	(A10)	(S10)		
ACTL % Pupils Transported	ACTL % Pupils Transportation		STD % Pupils Transported		
*	*	*	*		
(pl)	(pl)	(pl)	(pl)		
ACTL # of Pupils	ACTL # of Pupils		ACTL # of Pupils		
*	*	*	*		
(A11)	(S11)	(S11)	(S11)		
ACTL Cost of Transp./ Pupil/Yr.	STD Cost/Pupil/Yr		STD Cost/Pupil/Yr.		
=	=	=	=		
ACTL Transp. Expenditures	STD Transp. Cost of Pupils Actually Transported		STD. Transportation Exepnditures		
(t14)	(t 15) ⟶	(t 15)	(t 16)		

(V15 = t14 - t15)

(V16 = t15 - t16)

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V18)	+	(V19)	=	(V20)
PLANT OPERATION AND MAINTENANCE EFFICIENCY VARIANCE	+	PLANT OPERATION & MAINTENANCE FACILITIES DIFFERENTIAL VARIANCE	=	TOTAL PLANT OPERATIONS & MAINTENANCE EXPENDITURE VARIANCE

(A12) ACTL. Plant Operation and Maint. Cost * (p1) ACTL # of Pupils = ACTL Plant Operation & Maint. Expenditures	(2) 51.87 * (b1) * (A13) 0.009 * Building Assessed - Valuation ACTL (b2) (A14) 11.94 * [Local Bonded Debt - ACTL / (A13)] = Standard Plant Op. & Maint. Cost based on Actual Facilities in use		(2) (b1)*(A13) - (b2)* (A13) (A14) = =	(2) 51.87 + (b1) * (S12) 0.009* Bldg. Assessed Valuation Std. - (b2) * [(S13) Local Bonded Debt - Std. / (S2)] 11.94 = Stand., Plant Operation & Maint. Expenditures
(t17)	(t18)	⟶	(t18)	(t19)

(V18 = t17 - t18)

(V19 = t18 - t19)

(NOTE: * = p2 = Regression Constant
b1,b2 = p3 Regression Coeficients)

EXHIBIT II - COMPUTATIONAL FRAMEWORK

(V21) + (V22) = (V23)

Program Enrichment Variance - Staffing + Program Enrichment Variance - Salary Schedule = Total Program Enrichment Variance

---

Special Program instructional staffing cost per-pupil services

*

p4

Actual target Enrollment

*

Std # Teachers/ 1000 pupils

*

(p5)

Program enrichment Staffing factor

*

(p4)

Actual target enrollment

*

(S12)

Program teachers read

*

(A2)

ACTL Avg. Salary/teacher

=

Actual Program Staffing Expenditure

(t20)

Std. Program Staffing Reqmt at ACTL Rates

(t21)

(V21 = t20 - t21)

(S12)

*

A2

=

Program Teachers Requ.

*

(S2)

Std. Avg. Salary/Teachers

=

Std. Program Staffing Expenditures

(t21) ⟶ (t21)

(t22)

(V22 = t21 - t22)

EXPLANATION OF EXHIBIT III

PROGRAM LISTING

Exhibit III is a program listing of the actual formula used in computing district variances. The initial equations recompute the input into the forms as described in the previous paragraphs. Other set of equations are used to compute the dollar amounts of the various cost components identified. These equations start with variable 'B.' An additional set of equations compute variances in dollars and convert the dollars into dollars per pupil. These equations used the same symbols and subscripts as provided in Exhibit II.

EXHIBIT III - PROGRAM LISTING

```
prinf@tf deld fortran

      .DIMENSION S(14),X(14),V(28),P(28)
      WRITE (6,1001)
      .WRITE (6,1002)
C     READ STATE STANDARDS
      .READ (1,1000) (S(K),K=1,14)
      S1 .= S(2.)/S(3)
      .S2=S(1)
      S3=S(5)/S(2)
      .S4=(S(8)*S(3))/S(5)
      S5=S(4)/S(2.)
      S6=(S(7)*S(3))/S(4)
      S7=S(6)
      S8=0
      .S9=0
      .S10=0.5
      S11=S(9)
      .S12=S(10)
       .S13=S(12)
      S14=S(11)
      S15=(S(1)*S(13))/S(14)
      .B1=0.009
      .B2=11.94
      .A=51.866
C    READ INDIVIDUAL DISTRICT DATA
      DO 7.0 .I=1,26
      .READ (1,1000)(X(K),K=1,14)
      .A1=X(2)/X(3)
      .A2=X(1)
      A3=X(5)/X(2)
      A4=(X(8)*X(3))/X(5)
      A5=X(4)/X(2)
      A6=(X(7)*X(3))/X(4)
      A7=X(6)
      A8=0
      A9=0
      A10=(X(9)/S11)*S10
      A11=(A2/S2)*(S11/S10)
      A12=X(10)
      A13=X(12)
      A14=X(11)
      A15=(X(1)*X(13))/X(14)
      P1=X(3)
      P2=X(2)
      P3=(S1*P1)+(S1*P1*S3)+(S1*P1*S5)
      P4=X(14)
      P5=1.4
      S12=S1*P5*P4
```

```
C     COMPUTE DOLLAR
       T1=A1*A2.*P1
       T2.=S1*A2*P1
       T3=S1*S2*P1
       T4=A3*A4*A1*P1
       T5=S3*A4*A1*P1
       T6=S3*A4*S1*P1
       T7=S3*S4*S1*P1
       T8=A5*A6*A1*P1
       T9=S5*A6*A1*P1
       T10=S5*A6*S1*P1
       T11=S5*S6*S1*P1
       T12=A7*P1
       T13=S7*P1
       T14=A10*A11*P1
       T15=S10*A11*P1
       T16=S10*S11*P1
       T20=A15*P4
       T21=S12*A2
       T22=S12*S2
       T17=A12*P1
       T18=(A+(B1*A13)+(B2*(A14/A13)))*P1
       T19=(A+(B1*S13)+(B2*(S14/S13)))*P1

C          COMPUTE VARIANCES IN $
       V(1)=T1-T2
       V(2)=T2-T3
       V(3)=V(1)+V(2)
       V(4)=T4-T5
       V(5)=T5-T6
       V(6)=T6-T7
       V(7)=V(4)+V(5)+V(6)
       V(8)=T8-T9
       V(9)=T9-T10
       V(10)=T10-T11
       V(11)=V(8)+V(9)+V(10)
       V(12)=T12-T13
       V(13)=V(12.)
       V(14)=V(3)+V(7)+V(11)+V(13)
       V(15)=T14-T15
       V(16)=T15-T16
       V(17)=V(15)+V(16)
       V(18)=T17-T18
       V(19)=T18-T19
        V(20)=V(18)+V(19)
       V(21)=T20-.T21
       V(22)=T21-T22
       V(23)=V(21)+V(22)
       DO 200 JJ=1,23
       P(JJ)=V(JJ)/P1
       V(JJ)=V(JJ)*0.001
```

```
 .0    .¬NTINUE
       VX=0
       WRITE(6,1003) .I
       WRITE(6,1004) .V(1),V(2),VX,V(3)
       WRITE(6,1004) .V(4),V(5),V(6),V(7)
       WRITE(6,1004) .V(8),V(9),V(10),V(11)
       WRITE(6,1004) .V(12),V(13),VX,V(14)
       WRITE(6,1004) V(15),V(16),VX,V(17)
       WRITE(6,1004) V(18),V(19),VX,V(20)
       WRITE(6,1004) V(21),V(22),VX,V(23)
       WRITE(6,1005) I
       WRITE(6,1006) .P(1),P(2),VX,P(3)
       WRITE(6,1006) .P(4),P(5),P(6),P(7)
       WRITE(6,1006) .P(8),P(9),P(10),P(11)
       WRITE(6,1006) .P(12),P(13),VX,P(14)
       WRITE(6,1006) P(15),P(16),VX,P(17)
       WRITE(6,1006) P(18),P(19),VX,P(20)
       WRITE(6,1006) P(21),P(22),VX,P(23)
¬.0     .¬NTINUE
1000    FORMAT(14F8.0)
¬.01 FORMAT(1H0,' .INTER DISTRICT VARIANCE ANALYSIS')
¬.02 FORMAT(1H1,'LEVEL 1','LEVEL 2','LEVEL 3','TOTAL')
1003 .FORMAT(1H1,'IN ¬.9000)/YEAR','DISTRICT NO.',I4)
1004 .FORMAT(1H,4F10.0)
1005 .FORMAT(1H1,'IN ¬.PER PUPIL IN ADA','DISTRICT NO.',I4)
1006 .FORMAT(1H,4F10.2)
       END

R; T=3.96
```

ANALYSIS OF INTER-DISTRICT COMPARISONS

INTRODUCTION

Exhibits IV and V describe 22 variances from stage averages which were isolated for each of the 23 school districts in the State of Delaware. Because of the large number of variances developed, we felt it important to bring summary tables of these exhibits forward in our discussion of inter-district comparisons. Subsequent paragraphs were developed to highlight our interpretation of teacher expenditure variances, principals and supervisors expenditure variances, other instructional staff expenditure variances, total instructional cost variances, transportation expenditure variances, plant operation and maintenance expenditure variances, program enrichment expenditure variances, and total operating expenditure per pupil variances. Our comparisons were made considering the following groupings of districts:

(1) Rural
(2) Suburban
(3) Cities over 10,000 in populations (not including Wilmington
(4) The City of Wilmington, and
(5) The Alexis I Dupont district (the highest expenditure district in the State of Delaware)

PRINCIPALS & SUPERVISORY EXPENDITURE VARIANCES
DOLLARS PER-PUPIL

	STAFFING MIX	INSTRUCTIONALLY RELATED STAFFING	SALARY LEVEL	TOTAL
Rural	-14.16	-9.67	12.83	-11.00
Suburbs	- 4.03	3.05	2.99	2.00
Cities over 10,000	2.16	2.27	-6.43	- 2.00
Wilmington	32.21	4.98	-8.18	29.00
Alexis I. Dupont	49.00	4.32	2.68	56.00

An analysis of this table - indicates the following:

Two districts (Wilmington, A.I. Dupont) are spending substantially more for principals and supervisory salaries expenditures, and a substantial amount of the differences are attributable to relatively higher staffing levels. In other words, there are large differences between the state-wide averages of supervisory personnel per teacher and the actual ratio of supervisory to teacher personnel in these two districts. The inverse of this condition appears to hold true in the rural districts. It should be noted that in all categories of districts only a small portion of the total supervisory expenditure variances was attributable to differences in pupil-teacher ratios when compared to a state-wide average. The analysis indicates that the salary levels being paid to supervisory personnel in rural districts tended to be somewhat higher than the state-wide average (whereas in Wilmington it was somewhat lower). In suburban districts and in small cities, salaries were relatively close to the state average. One might infer from this analysis that the largest districts may require larger supervisory staffing levels than would otherwise be required. It also can be surmised that the richest district is willing to maintain proportionally larger supervisory staffs.

TEACHER EXPENDITURE VARIANCES
DOLLARS PER-PUPIL

	STAFFING LEVEL	SALARY LEVEL	TOTAL
Rural	-46.16	-35.14	-81.29
Suburbs	19.46	19.48	38.94
Cities Over 10,000	15.70	12.63	3.06
Wilmington	39.51	28.25	67.75
Alexis I. Dupont	27.42	14.51	41.92

An examination of this table shows that rural districts spend considerably less per pupil on teacher expenditures and that the suburbs and Wilmington city spends substantially more. A further examination of this table highlights the fact that a substantial portion of Wilmington's teacher expenditure variances are attributable to a higher than average ratio of numbers of teachers employed relative to pupils. It also shows that Wilmington maintains a substantially higher salary level than the state average. This may be because of the tenure and experience level of the teachers employed in Wilmington's schools. On the other hand, the Alexis I. Dupont district (a suburban district which spends more ~~money per~~ pupil than any other district in the State of Delaware) supports salary levels that are only modestly higher than the state-wide average. The major teacher expenditure differential appears to be associated with Alexis I. Dupont's high teacher staffing levels.

OTHER INSTRUCTIONAL STAFF EXPENDITURES VARIANCES
DOLLARS PER-PUPIL

	STAFFING MIX	INSTRUCTIONALLY RELATED STAFFING	SALARY LEVEL	TOTAL
Rural	4.03	3.52	.56	7.00
Suburbs	0.19	1.48	4.70	6.00
Cities Over 10,000	3.48	0.92	4.39	0
Wilmington	2.95	1.76	7.71	3.00
Alexis I. Dupont	1.56	2.61	11.83	16.00

An analysis of the above variance information suggests that the rural districts spend substantially less in other instructional staff expenditure categories primarily due to the fact that they employ fewer such staff relative to teachers. Suburbs however employ instructionally related staffs in somewhat the same proportions as the state-wide average, but they tend to pay higher than average salaries to such personnel. This is particularly true of the Alexis I. Dupont district. The Wilmington schools employ close to average proportions of such staffs. They pay considerably less for this staff than do suburbs. This may indicate a higher use of paraprofessional personnel in the Wilmington schools.

TOTAL INSTRUCTIONAL COST VARIANCE
DOLLARS PER-PUPIL

	TEACHER EXPENDITURE VARIANCE	PRINC.& SUPERV. STAFF EXP. VARIANCE	OTHER INSTR. STAFF EXP. VARIANCE	OTHER INSTR. COST VARIANCE	TOTAL INSTR. COST VARIANCE
Rural	-81.29	-11.00	-7.00	-2.00	-101.29
Suburbs	38.94	2.00	6.00	4.00	50.94
Cities Over 10,000	3.06	- 2.00	0	-8.00	- 6.94
Wilmington	67.75	29.00	3.00	2.00	95.75
Alexis I. Dupont	41.92	56.00	16.00	38.00	151.92

This table brings together all the components of the instructional cost variances. A significant finding in this table is the observation that the Alexis I. Dupont district spends considerably more for other instructional costs such as text books, materials and supplies and clerical materials. This total instructional costs variance in such a district lends support to the theory that instructional input is in part, directly related to a district's ability to pay. On the other hand, Wilmington's larger than average instructional expenditures are primarily identified as over-spending for more teachers at higher pay and more principals and supervisory personnel at average pay. Other overall variances in Wilmington's instructional expenditures are trivial when compared to the state-wide average. The major portion of rural districts underspending is attributable to the teacher expenditures. They tend to employ fewer teachers per pupil and pay less per teacher.

TRANSPORTATION EXPENDITURE VARIANCES

	TOTAL TRANSPORTATION EXPENDITURE VARIANCE / TOTAL DOLLARS PER-PUPIL
Rural	26.78
Suburbs	9.17
Cities over 10,000	19.81
Wilmington	7.48
A. I. Dupont	44.16

An analysis of this table reveals that Wilmington spends less per pupil on transportation than the state-wide average. Rural districts spend considerably more but the **richest** district spent most of all in relation to state-wide averages.

(NOTE: Because of assumptions made as to percentage of pupils transported, the isolation of transportation effort and efficiency variances proved meaningless in this analysis.)

PLANT OPERATION AND MAINTENANCE EXPENDITURE VARIANCES
(DOLLARS PER-PUPIL)

	EFFICIENCY	FACILITIES DIFFERENTIALS	TOTAL
Rural	14.81	-5.35	9.46
Suburbs	-2.02	1.47	- .54
Cities Over 10,000	-13.84	5.30	-8.54
Wilmington	14.14	0.32	14.46
Alexis I. Dupont	20.84	26.61	47.46

Variances developed in this table considered approximations of cost that may have been incurred based on average age and size of buildings in place. The efficiency variances highlighted what one expects the district to spend (considering the actual buildings they have) relative to what they actually did spend. Facilities differentials variance considered the difference between what they would have been expected to spend (considering the buildings they do have) and what they would have spent if an average mix of buildings were available for their use.

As might be expected Wilmington has to spend considerably more for the kinds of buildings they have in place in order to maintain them in a large city environment. But Wilmington's low facilities differential variance indicate that their facilities do not differ greatly from the state averages. It should also be noted that the rural districts have to pay considerably more to operate and maintain the kinds of buildings they have in place. This may be attributable to the number of small buildings that require fixed minimum staffing levels in order to maintain them. What is increasingly apparent is that the richest district spends more and has more expensive mix of facilities. (A note of caution: The above analysis was made using an approximation formula with the key determinants of facilities differentials being 'local bond debt,' to measure the newness of the facilities, and 'the ratio of local bond debt to building assessed evaluation,' to measure the age of such facilities. This formula developed approximations on approximations and only a rough estimate of expected expenditure was obtained. Therefore the above analysis may have led us to some spurious conclusions.

PROGRAM ENRICHMENT EXPENDITURE VARIANCES

	STAFFING	SALARY LEVEL	TOTAL
Rural	-83.31	-12.13	-95.43
Suburbs	-28.20	2.06	-26.13
Cities Over 10,000	-45.55	- 1.90	-47.45
Wilmington	-449.38	33.33	-416.08
Alexis I. Dupont	0	0	0

As mentioned previously the results obtained are too difficult to interpret intelligently based on the roughness of the inputs used to measure program enrichment differentials. Primarily it is shown in the above table that Wilmington contains a large proportion of potential target group pupils against which they are not now providing categorical instruction through added staffing. It was shown that there are potentially large pupil target populations to be served but an accurate knowledge of existing and required staffing is necessary before this methodology can be used to properly isolate the amount required to deliver categorical programs to such target populations.

VARIANCE METHODOLOGIES COMPARED

	TOTAL OPERATING EXPENDITURES PER PUPIL	VARIANCE FROM STATE AVERAGE OF $659	TOTAL INSTRUCTIONAL COST VARIANCE
Rural	603.00	-56.00	-101.29
Suburbs	617.00	-42.00	50.94
Cities Over 10,000	602.00	-57.00	- 6.94
Wilmington	792.00	133.00	95.75
Alexis I. Dupont	915.00	256.00	151.92

The most conventional inter-district comparison criteria is 'Total Operating Expenditure Per Pupil.' We have made such a comparison (using various district groupings as shown above) against the state-wide average. This comparison indicates that the Wilmington school district spends considerably more per pupil than the state-wide average. One might initially conclude that Wilmington's schools are provided with substantially greater educational inputs than schools located in rural and suburban areas and in cities over 10,000. Using 'Total Operating Expenditures Per Pupil' as a criteria one might initially conclude that pupils in Wilmington are receiving higher educational opportunities than pupils in the rest of the state. Further analysis indicates that this may not necessarily be true. By examination of the total instructional cost variance, it appears that Wilmington and all of the suburban districts are spending more in the instructional area than the state-wide average and the rural districts are spending considerably less. But as shown in a previous analysis of teacher expenditure variance it was shown that a substantial portion of the

Wilmington total instructional cost is associated with higher than average salary levels paid. It was also shown in the analysis of principals and supervisor expenditure variances, higher than average supervisory staffing levels were maintained in Wilmington. No evidence exists which relates this kind of expenditure to equal educational opportunity.

Other analyses previously presented indicated that Wilmington does not provide excessive amounts of other instructional costs (when related to the state average). It was shown that Wilmington is burdened with higher plant operation in maintenance costs (relative to the state average), and it is indicated that a large proportion of categorical program needs in Wilmington, probably go unserved. On the other hand the Alexis I Dupont District tends to show up as being the biggest spender in all categories. It has the added advantage of not having to pay an excessively high salary levels in the instructional component areas. However, Alexis I. Dupont schools do spend money to attract other instructional staff to enrich their programs and provide transportation services in excess of even the rural districts. They operate expensive facilities which require more maintenance. They have little need to supply categorical programs for disadvantaged in that numbers of these pupils in this district were non-existent.

In summary we conclude that district comparisons done on the total operating expenditure per pupil basis can be highly misleading and that only through analysis of the variations in the components of per-pupil expenditure make-up will we be able to tell the extent of disparities or to redirect educational inputs in such a way as to overcome these types of disparities.

```
prinf@tf deld fortran

      .DIMENSION S(14),X(14),V(28),P(28)
      WRITE (6,1001)
      .WRITE (6,1002)
C     READ STATE STANDARDS
      .READ (1,1000) (S(K),K=1,14)
      S1 .= S(2.)/S(3)
      .S2=S(1)
      S3=S(5)/S(2)
      .S4=(S(8)*S(3))/S(5)
      S5=S(4)/S(2.)
      S6=(S(7)*S(3))/S(4)
      S7=S(6)
      S8=0
      .S9=0
      .S10=0.5
      S11=S(9)
      .S12=S(10)
       .S13=S(12)
      S14=S(11)
      S15=(S(1)*S(13))/S(14)
      .B1=0.009
      .B2=11.94
      .A=51.866
C   READ INDIVIDUAL DISTRICT DATA
      DO 7.0 .I=1,26
      .READ (1,1000)(X(K),K=1,14)
      .A1=X(2)/X(3)
      .A2=X(1)
      A3=X(5)/X(2)
      A4=(X(8)*X(3))/X(5)
      A5=X(4)/X(2)
      A6=(X(7)*X(3))/X(4)
      A7=X(6)
      A8=0
      A9=0
      A10=(X(9)/S11)*S10
      A11=(A2/S2)*(S11/S10)
      A12=X(10)
      A13=X(12)
      A14=X(11)
      A15=(X(1)*X(13))/X(14)
      P1=X(3)
      P2=X(2)
      P3=(S1*P1)+(S1*P1*S3)+(S1*P1*S5)
      P4=X(14)
      P5=1.4
      S12=S1*P5*P4
```

```
C     COMPUTE DOLLAR
       T1=A1*A2.*P1
       T2.=S1*A2*P1
       T3=S1*S2*P1
       T4=A3*A4*A1*P1
       T5=S3*A4*A1*P1
       T6=S3*A4*S1*P1
       T7=S3*S4*S1*P1
       T8=A5*A6*A1*P1
       T9=S5*A6*A1*P1
       T10=S5*A6*S1*P1
       T11=S5*S6*S1*P1
       T12=A7*P1
       T13=S7*P1
       T14=A10*A11*P1
       T15=S10*A11*P1
       T16=S10*S11*P1
       T20=A15*P4
       T21=S12*A2
       T22=S12*S2
       T17=A12*P1
       T18=(A+(B1*A13)+(B2*(A14/A13)))*P1
       T19=(A+(B1*S13)+(B2*(S14/S13)))*P1

C        COMPUTE VARIANCES IN $
       V(1)=T1-T2
       V(2)=T2-T3
       V(3)=V(1)+V(2)
       V(4)=T4-T5
       V(5)=T5-T6
       V(6)=T6-T7
       V(7)=V(4)+V(5)+V(6)
       V(8)=T8-T9
       V(9)=T9-T10
       V(10)=T10-T11
       V(11)=V(8)+V(9)+V(10)
       V(12)=T12-T13
       V(13)=V(12.)
       V(14)=V(3)+V(7)+V(11)+V(13)
       V(15)=T14-T15
       V(16)=T15-T16
       V(17)=V(15)+V(16)
       V(18)=T17-T18
       V(19)=T18-T19
        V(20)=V(18)+V(19)
       V(21)=T20-.T21
       V(22)=T21-T22
       V(23)=V(21)+V(22)
       DO 200 JJ=1,23
       P(JJ)=V(JJ)/P1
       V(JJ)=V(JJ)*0.001
```

```
¬.0    .¬NTINUE
       VX=0
       WRITE(6,1003) .I
       WRITE(6,1004) .V(1),V(2),VX,V(3)
       WRITE(6,1004) .V(4),V(5),V(6),V(7)
       WRITE(6,1004) .V(8),V(9),V(10),V(11)
       WRITE(6,1004) .V(12),V(13),VX,V(14)
       WRITE(6,1004) V(15),V(16),VX,V(17)
       WRITE(6,1004) V(18),V(19),VX,V(20)
       WRITE(6,1004) V(21),V(22),VX,V(23)
       WRITE(6,1005) I
       WRITE(6,1006) .P(1),P(2),VX,P(3)
       WRITE(6,1006) .P(4),P(5),P(6),P(7)
       WRITE(6,1006) .P(8),P(9),P(10),P(11)
       WRITE(6,1006) .P(12),P(13),VX,P(14)
       WRITE(6,1006) P(15),P(16),VX,P(17)
       WRITE(6,1006) P(18),P(19),VX,P(20)
       WRITE(6,1006) P(21),P(22),VX,P(23)
¬.0    .¬NTINUE
1000   FORMAT(14F8.0)
¬.01 FORMAT(1H0,' .INTER DISTRICT VARIANCE ANALYSIS')
¬.02 FORMAT(1H1,'LEVEL 1','LEVEL 2','LEVEL 3','TOTAL')
1003 .FORMAT(1H1,'IN ¬.9000)/YEAR','DISTRICT NO.',I4)
1004 .FORMAT(1H,4F10.0)
1005 .FORMAT(1H1,'IN ¬.PER PUPIL IN ADA','DISTRICT NO.',I4)
1006 .FORMAT(1H,4F10.2)
       END

R; T=3.96
```

EXHIBIT IV

VARIANCE ISOLATION CASE STUDY

INSTRUCTIONAL COST VARIANCES

	TEACHER EXPENDITURE VARIANCES					
	STAFFING		SALARY LEVEL		TOTAL	
	a	b	a	b	a	b
Wilmington	543	39.51	388	28.24	931	67.75
New Castle	63	10.16	10	1.66	73	11.82
Claymont	50	15.78	11	3.40	61	19.19
Conrad Area	72	12.31	97	16.50	169	28.82
De La Warr	163	40.73	-57	-14.29	106	26.44
Alexis I. Dupont	71	27.42	38	14.51	109	41.92
Alfred I. Dupont	306	32.69	416	44.71	725	77.40
Marshallton - McKean	-49	-14.52	94	27.90	45	13.39
Mt. Pleasant	168	32.20	294	56.40	462	88.60
Stanton	60	9.75	152	24.46	212	34.21
Newark	232	17.70	1	.08	233	17.79
Dover	69	12.03	-146	-25.40	-77	-13.36
Lake Forest	64	23.08	-90	-32.50	-26	-9.42
Appoquinimink	-32	-8.88	-159	-44.83	-191	-53.72
Milford	28	10.95	-75	-29.73	-48	-18.79
Smyrna	-1606	-333.88	-236	-49.05	-1841	-382.92
Caesar Rodney	-14	-6.36	-59	-26.42	-73	-32.77
Delmar	26	45.02	-17	-28.76	10	16.27
Indian River	-66	-11.83	-188	-33.95	-254	-45.77
Cape Henlopen	44	22.43	-83	-42.32	-39	-19.90
Seaford	29	8.55	-55	-16.42	-26	-7.87
Woodbridge	71	20.32	-138	-39.30	-67	-18.99
Laurel	13	6.96	-82	-43.22	-68	-36.26
Suburbs	894	19.46	895	19.48	1789	38.94
Cities Over 10,000	296	15.70	-238	-12.63	58	3.06
Cities Under 10,000 & Rural	-1510	-46.16	-1150	-35.14	-2660	-81.29

EXHIBIT IV

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCES

PRINCIPALS AND SUPERVISORY EXPENDITURE VARIANCES:

	STAFFING MIX		INSTRUCTIONALLY RELATED STAFFING		SALARY LEVEL		TOTAL	
	a	b	a	b	a	b	a	b
Wilmington	443	32.21	68	4.98	-113	-8.18	399	29.00
New Castle	-38	-6.11	8	1.34	-57	-9.23	-87	-14.00
Claymont	26	8.17	5	1.48	-75	-23.66	-44	-14.00
Conrad Area	-276	-47.01	18	2.99	217	37.02	-41	-7.00
De La Warr	-46	-11.44	24	6.01	-22	-5.57	-44	-11.00
Alexis I. Dupont	127	49.00	11	4.32	7	2.68	145	56.00
Alfred I. Dupont	-29	-3.09	43	4.62	4	.47	19	2.00
Marshallton - McKean	-77	-22.81	-11	-3.22	104	31.03	17	5.00
Mt. Pleasant	0	.08	20	3.82	-41	-7.90	-21	4.00
Stanton	4	.70	11	1.83	102	16.47	118	19.00
Newark	-166	-12.71	40	3.08	87	6.63	-39	-3.00
Dover	124	21.59	7	1.28	-126	-21.87	6	1.00
Lake Forest	-117	-42.61	16	5.78	77	27.83	-25	-9.00
Appoquinimink	-39	-10.97	-6	-1.56	-2	-46	-46	-13.00
Milford	8	3.16	3	1.29	-47	-18.44	-35	-14.00
Smyrna	0	0	-2774	-576.74	2485	-516.74	-289	-60.00
Caesar Rodney	11	4.93	-2	-91	-20	-9.02	-11	-5.00
Delmar	-56	-95.39	6	10.76	14	24.63	-35	-60.00
Indian River	-79	-14.29	-11	-1.97	-10	-1.78	-100	-18.00
Cape Henlopen	16	8.37	7	3.50	-13	-6.87	10	5.00
Seaford	-122	-36.47	7	1.99	85	25.48	-30	-9.00
Woodbridge	-86	-24.60	14	3.89	20	5.72	-53	-15.00
Laurel	-16	-8.37	2	.99	-22	-11.62	-36	-19.00
Suburbs	-185	-4.03	140	3.05	137	2.99	92	2.00
Cities Over 10,000	41	2.16	43	2.27	-121	-6.43	-38	-2.00
Cities Under 10,000 & Rural	-463	-14.16	-316	-9.67	420	12.83	-360	-11.00

EXHIBIT IV

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCES

OTHER INSTRUCTIONAL STAFF EXPENDITURE VARIANCES:

	STAFFING MIX		INSTRUCTIONALLY RELATED STAFFING		SALARY LEVEL		TOTAL	
	a	b	a	b	a	b	a	b
Wilmington	41	2.95	24	1.76	-106	-7.71	-41	-3.00
New Castle	-15	-2.44	4	68	-1	-0.24	-12	-2.00
Claymont	9	2.84	4	1.18	9	2.98	22	7.00
Conrad Area	-5	-.92	3	.60	-39	-6.67	-41	-7.00
De La Warr	-34	-8.42	18	4.42	56	14.00	40	10.00
Alexis I. Dupont	4	1.56	7	2.61	31	11.83	42	16.00
Alfred I. Dupont	71	7.56	28	3.01	126	13.42	225	24.00
Marshallton - McKean	-42	-12.52	-3	-.82	-9	-2.65	-54	-16.00
Mt. Pleasant	-22	-4.17	15	2.88	69	13.30	63	12.00
Stanton	30	4.77	3	.45	-45	-7.22	-12	-2.00
Newark	63	4.83	13	1.02	-51	-3.86	26	2.00
Dover	4	.62	4	.70	-31	-5.32	-23	-4.00
Lake Forest	-19	-6.84	4	1.60	-5	-1.75	-19	-7.00
Appoquinimink	10	2.93	-2	-54	-19	-5.39	-11	-3.00
Milford	-26	-10.34	3	1.00	16	6.33	-8	-3.00
Smyrna	0	0	-321	-66.78	196	40.78	-125	-26.00
Caesar Rodney	-9	-4.14	0	-22	-30	-13.64	-40	-18.00
Delmar	0	0	0	0	-15	-26.00	-15	-26.00
Indian River	-5	-.87	-1	-24	-105	-18.89	-111	-20.00
Cape Henlopen	-83	-42.16	11	5.38	109	55.77	37	19.00
Seaford	-10	-2.87	1	.41	-29	-8.54	-37	-11.00
Woodbridge	-3	-98	6	1.79	15	4.19	18	5.00
Laurel	0	0	0	0	-49	-26.00	-49	-26.00
Suburbs	-9	-19	68	1.48	216	4.70	276	6.00
Cities Over 10,000	66	3.48	17	.92	-83	-4.39	0	0
Cities Under 10,000 & Rural	-132	-4.03	-115	-3.52	18	56	-229	-7.00

EXHIBIT IV

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCES

	OTHER INSTRUCTIONAL COST VARIANCE		TOTAL INSTRUCTIONAL COST VARIANCE	
	a	b	a	b
Wilmington	27	2.00	1316	95.75
New Castle	-19	-3.00	-44	-7.18
Claymont	-28	-9.00	10	3.19
Conrad Area	-18	-3.00	69	11.82
De La Warr	-60	-15.00	42	10.44
Alexis I. Dupont	99	38.00	394	151.92
Alfred I. Dupont	178	19.00	1147	122.40
Marshallton - McKean	3	1.00	11	3.39
Mt. Pleasant	-5	-1.00	498	95.60
Stanton	12	2.00	330	53.21
Newark	-144	-11.00	76	5.79
Dover	-12	-2.00	-106	-18.36
Lake Forest	-11	-4.00	-81	-29.42
Appoquinimink	-11	-3.00	-258	-72.72
Milford	-18	-7.00	-108	-42.79
Smyrna	-14	-3.00	-2269	-471.92
Caesar Rodney	-7	-3.00	-131	-58.77
Delmar	-13	-22.00	-54	-91.73
Indian River	-28	5.00	493	-88.77
Cape Henlopen	27	14.00	36	18.10
Seaford	0	0	-93	-27.87
Woodbridge	-39	-11.00	-140	-39.99
Laurel	-4	-2.00	-157	-83.26
Suburbs	184	4.00	2341	50.94
Cities Over 10,000	-151	-8.00	-131	-6.94
Cities Under 10,000 & Rural	-65	-2.00	-3314	-101.29

EXHIBIT V

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCES

TRANSPORTATION EXPENDITURE VARIANCES:

	EFFICIENCY		EFFORT		TOTAL	
	a	b	a	b	a	b
Wilmington	-340	-24.70	237	17.21	-103	-7.48
New Castle	-68	-11.05	94	15.13	25	4.08
Claymont	-80	-25.22	48	15.27	-31	-9.96
Conrad Area	-104	-17.73	95	16.29	-8	-1.44
De La Warr	-54	-13.48	56	13.88	2	.40
Alexis I. Dupont	73	28.02	42	16.14	115	44.16
Alfred I. Dupont	-42	-4.47	173	18.50	131	14.04
Marshallton - McKean	-4	-1.07	58	17.19	54	16.11
Mt. Pleasant	-78	-14.91	101	19.42	23	4.50
Stanton	26	4.26	105	16.92	131	21.17
Newark	79	6.00	197	15.01	275	21.01
Dover	38	6.54	75	13.01	112	19.55
Lake Forest	25	9.15	34	12.45	60	21.61
Appoquinimink	28	7.95	41	11.49	69	19.43
Milford	19	7.38	32	12.67	51	20.05
Smyrna	67	13.95	54	11.16	121	25.11
Caesar Rodney	-7	26.07	-7	12.93	-131	39.00
Delmar	27	46.25	7	12.75	34	58.99
Indian River	116	20.96	68	12.34	185	33.30
Cape Henlopen	31	16.01	23	11.68	54	27.69
Seaford	10	2.87	46	13.71	56	16.58
Woodbridge	57	16.15	42	11.92	98	28.07
Laurel	22	11.53	22	11.61	44	23.15
Suburbs	-338	-7.36	759	16.53	421	9.17
Cities Over 10,000	109	5.80	264	14.01	374	19.81
Cities Under 10,000 & Rural	475	14.53	401	12.25	876	26.78

EXHIBIT V

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCES

	PLANT OPERATION & MAINTENANCE EXPENDITURE VARIANCES:					
	EFFICIENCY		FACILITY DIFFERENTIAL		TOTAL	
	a	b	a	b	a	b
Wilmington	194	14.14	4	.32	199	14.46
New Castle	-104	-16.79	26	4.25	-78	-12.54
Claymont	15	4.80	-11	-3.34	5	1.46
Conrad Area	-54	-9.26	-25	-4.28	-79	-13.54
De La Warr	-41	-10.16	2	.62	-38	-9.54
Alexis I. Dupont	54	20.84	69	26.61	123	47.46
Alfred I. Dupont	136	14.49	-10	-1.04	126	13.46
Marshallton - McKean	-22	-6.54	3	1.00	-19	-5.54
Mt. Pleasant	-33	-6.29	40	7.74	8	1.46
Stanton	13	2.08	27	4.38	40	6.46
Newark	-325	-24.82	95	7.27	-230	-17.54
Dover	62	10.70	4	.75	66	11.46
Lake Forest	-3	-1.17	-34	-12.37	-37	13.54
Appoquinimink	0	-.06	-34	-9.49	-34	-9.54
Milford	-22	-8.50	0	-.04	-22	-8.54
Smyrna	-54	-11.28	-40	-8.27	-94	-19.54
Caesar Rodney	58	-.73	29	-1.81	87	-2.54
Delmar	14	23.95	-1	-1.49	13	22.46
Indian River	49	8.88	-30	-5.42	19	3.46
Cape Henlopen	44	22.22	-19	-9.76	24	12.46
Seaford	64	19.23	-29	-8.77	35	10.46
Woodbridge	-3	-.98	-2	-.57	-5	-1.54
Laurel	-26	-14.00	12	6.45	-14	-7.54
Suburbs	-93	-2.02	68	1.47	-25	-.54
Cities Over 10,000	-261	-13.84	100	5.30	-161	-8.54
Cities Under 10,000 & Rural	484	14.81	-175	-5.35	309	9.46

EXHIBIT V

VARIANCE ISOLATION CASE STUDY
INSTRUCTIONAL COST VARIANCE

PROGRAM ENRICHMENT EXPENDITURE VARIANCES:

	STAFFING		SALARY SCHEDULE		TOTAL	
	a	b	a	b	a	b
Wilmington	-6178	-449.38	458	33.33	-5720	-416.05
New Castle	-23	-3.71	1	.19	-22	-3.52
Claymont	-66	-20.71	1	.23	-65	-20.53
Conrad Area	-21	-3.62	6	1.08	-15	-2.54
De La Warr	-771	-192.78	-37	-9.32	-809	-202.11
Alexis I. Dupont	0	0	0	0	0	0
Alfred I. Dupont	-35	-3.77	4	.39	-32	-3.38
Marshallton - McKean	-83	-24.56	8	2.25	-75	-22.31
Mt. Pleasant	-20	-3.80	4	.74	-16	-3.06
Stanton	-115	-18.60	7	1.21	-108	-17.39
Newark	-166	-21.68	0	0	-166	-12.67
Dover	-677	-117.69	-53	-9.29	-731	-126.98
Lake Forest	-159	-57.70	-19	-7.01	-178	-64.71
Appoquinimink	-309	-87.16	-54	-15.12	-363	-102.28
Milford	-116	-45.82	-22	-8.55	-138	-54.37
Smyrna	-259	-53.96	-83	-17.28	-343	-71.23
Caesar Rodney	-2	0	-4	0	-6	0
Delmar	0	0	0	0	0	0
Indian River	-504	-90.77	-79	-14.15	-582	-104.92
Cape Henlopen	-310	-158.11	-48	-24.21	-358	-182.31
Seaford	-365	-108.80	-17	-4.99	-382	-113.79
Woodbridge	-390	-111.29	-59	-16.95	-450	-128.24
Laurel	-321	-170.19	-41	-21.65	-362	-191.85
Suburbs	-1296	-28.20	95	2.06	-1201	-26.13
Cities Over 10,000	-859	-45.55	-36	-1.90	-895	-47.45
Cities Under 10,000 & Rural	-2725	-83.31	-397	-12.13	-3122	-95.43

D. A STUDY OF DISPARITY IN OCCUPANCY COSTS

PROBLEMS OF OBTAINING DATA

The last major effort to examine the nature and composition of public school facilities was undertaken in the spring of 1962 by Dr. George J. Collins of the NCES, OE, Dept. of HEW. This study was entitled "National Inventory of School Facilities and Personnel." This report was updated by Collins and Stormer in 1965 in a study entitled "Condition of the School Plants," 1964-65.

These reports were published as chapters in a study prepared for Subcommittee on Economic Progress on the Joint Economic Committee, Congress of the U.S., 89th Congress, Second Session, December, 1966.

Although this information has not been updated to a more recent school year it was felt that the basic findings would still be representative of today's school facilities.

The Hypothesis We Tested

Based upon preliminary analysis of the Collins data we hypothesized that there were significant differences in depreciation per pupil among 15 big cities identified in the study and between these cities and national averages.

The Approach

From the Collins report we were able to obtain the numbers of schools and classrooms available for the 1964-65 school year for urban, urban fringe, and areas outside SMSAs. We were also able to develop aging of these buildings based on their dates of construction. For those classrooms constructed in 1965 we were able to develop average cost of construction.

We were also able to obtain agings of the population of school "plant facilities" for 15 major cities. Using other data sources we were able to estimate numbers of classrooms available at elementary and secondary grade levels. We obtained construction cost indicies for all prior years using 1965 as the base year. We developed a computer model to:

compute the cost of new construction for each year for 15 cities and for urban fringe and rural school populations;

develop depreciation per pupil for the same school populations.

We then prepared rankings of the results obtained.

FINDINGS

There was significant variation in depreciation per pupil among the 15 big cities tested and between these cities and the national averages.

	Depreciation Per-Pupil	% of Combined Fringe and Rural
Urban - Elementary	7.345	39
Urban - Secondary	14.484	78
Urban - Combined	9.251	50
Urban Fringe	17.644	95
Rural	19.242	1.04
Combined Fringe + Rural	18.552	1.00

On the average the 15 big city school systems incurred half as much depreciation per pupil as did the Urban Fringe and Rural Systems.

COMPARATIVE ANALYSIS - 15 BIG CITIES

	Depreciation Per - Pupil	Rank
1. Baltimore	8.873	8
2. Boston	4.295	1
3. Buffalo	7.310	5
4. Chicago	7.334	6
5. Cleveland	6.789	3
6. Detroit	8.897	9
7. Houston	14.219	15
8. Los Angeles	13.222	14
9. Milwaukee	8.927	10

	Depreciation Per-Pupil	Rank
10. New York	10.097	13
11. Philadelphia	8.127	7
12. Pittsburgh	5.728	2
13. St. Louis	6.362	4
14. San Francisco	9.209	12
15. Washington	9.077	11

Rank Order - Low to High		% of Fringe and Rural *	cum % of cities
1. Boston	4.295	23	
2. Pittsburgh	5.728	31	
3. Cleveland	6.289	34	
4. St. Louis	6.362	34	
5. Buffalo	7.310	39	
6. Chicago	7.334	40	40%
7. Philadelphia	8.127	44	
8. Baltimore	8.873	48	
9. Detroit	8.897	48	
10. Milwaukee	8.927	48	
11. Washington	9.077	49	
12. San Francisco	9.209	49	80%
13. New York	10.097	54	
14. Los Angeles	13.222	71	
15. Houston	14.219	77	100%

*(18.552/pupil)

The big city school systems ranged from $4.30 per pupil to $14.22 per pupil. Forty (40) percent of the cities incurred forty (40) percent as much depreciation per pupil as the urban fringe and rural school systems. Eighty (80) percent of the big city school systems incurred less than fifty (50) percent as much depreciation per pupil as the urban fringe and rural school systems.

This disparity in depreciation per pupil may reflect more recent growth of non-big city school systems as well as possible extra effort in providing newer facilities being made by these school systems. Although the figures do not reflect capital improvements made to schools over these years, the differentials shown may be partially indicative of the how much additional capital outlay effort would be required to provide big cities with a comparable educational plant. In any case, these differentials are significant enough for us to conclude that they ought to be reflected in per-pupil expenditure development.

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